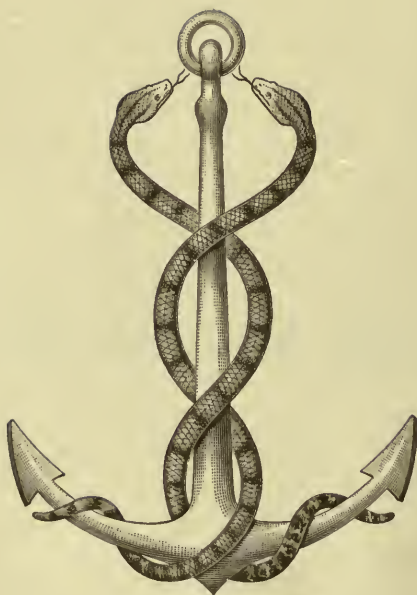


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THE
EDINBURGH MEDICAL JOURNAL.

EDINBURGH MEDICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

THE BORDERLAND.¹

By G. W. BALFOUR, M.D., LL.D., *Consulting Physician to the Royal Infirmary, Physician-in-Ordinary to Her Majesty the Queen.*

LECTURE I.

THE famous divine, Dr. J. M. Mason, called the American Paul, when asked to write an account of his travels, replied: "I write travels! I know not the nature of the air I breathe, the water I drink, or the land I travel over. I have lived solely for polemical divinity." Some similar idea crossed my mind when asked to lecture on Insanity. I have never been an inmate of an asylum for the insane, either as physician or patient, consequently my acquaintance with insanity is more or less that of an amateur, and not that of an expert. Still, in the course of many years spent in the practice of medicine, there come before us all an almost infinite variety of phases of mental activity, many of which are of considerable interest both to the physician and the public in their relation to true insanity. Some of these deviations from what we are pleased to call the mental norm are temporary, and others are more or less permanent in their character. They pervade every rank in life and every profession, and are found in connection with various morbid alterations of the organism, with the commencement of senile changes, chiefly those affecting the brain, and at times with apparently perfect health. So common, indeed, are mental abnormalities, and so varied are their characteristics, that there is probably not one of us entirely free from some more or less insane peculiarity. So much, indeed, is this the case, that one old friend was in the habit of watching all his acquaintances for the revelation of their

¹ The Morison Lectures for 1900. Delivered at the Royal College of Physicians of Edinburgh, December 4, 1900.

special characteristic, and he was never happy until he had discovered the point upon which each of his friends was—as he called it—insane; while, in their turn, his friends were in the habit of regarding this fixed idea as an incontestable proof of the insanity of their critic.

Many years ago I had a visit from one of the ablest and most learned men of his day, anxious to know how he could best arrest the pernicious habit of tight lacing in females, which had struck him as having become unusually prevalent, while he himself had suddenly become morbidly alive to the injurious results that might follow it. About a month later I had a long letter from the same gentleman, in deep distress on account of the number of very stout people he met in the streets, all of whom seemed perfectly unaware of the terrible risk they ran of having an apoplectic attack, and he was desirous of ascertaining what steps he could take to open the eyes of these unfortunates. This is a very interesting example of the manner in which senile changes may so influence a man of benevolent disposition as to cause him to take an undue and uncalled-for interest in the well-being of his fellow-men. It is not insanity, but it might very well lead to insane actions. Fortunately, the gentleman referred to had sufficient prudence to take advice and sufficient wisdom to act upon the advice given. Upon another occasion an old lady suddenly inquired at me what was my idea of a soul? I replied that I was quite content to wait till I became a soul myself without concerning myself beforehand as to the probable characteristics of that entity. Upon this she assured me that her belief was that a soul resembled a luminous sheep's kidney floating through the air! Happening to mention this to a friend who was an adept in all spiritualistic learning, he replied that Marion Crawford, the novelist, had once told him of a man who was born blind, and at the age of 20 had sight bestowed by a very simple operation. This man said he had a very definite idea of what he believed sight to be, but it was not the least like the real thing. "You and I," he added, "and the orthodox old lady, are all as incapable of forming an idea of a soul as that lad was of forming an idea of the charms of a landscape. My own idea is that a soul is a thing of the size and form of the human body, but made of something like air, quite imperceptible to our senses. This, of course, is nonsense, as it involves a dim idea of clothes,—which is absurd—and also of eyes and ears, whereas a soul needs not, and has not, any eyes to see or ears to hear, but has other and much higher means of perception. As to size, it is not omnipresent, and the old lady's kidney is as good as my human figure, which, among other inaccuracies, is based on an idea of the law of gravitation, which is inapplicable, and over which, to do the old lady justice, she had risen. Her idea of luminosity was a confusion of phenomena—the soul seems to have some power of

directing forces invisible to us, especially electricity, a thing of which we can only perceive the effects; hence thought-transference, and hence the hallucinations commonly called ghosts, which are what are called self-luminous apparitions, spirit-raps, etc., produced by action on the molecules of the brain. Hence, also, the statues made up of atoms too tenuous to be perceptible to us, but perceptible (like the stars only shown in astronomical photographs) to the higher sensitiveness of the photographic plate, whence what are called spirit-photographs, and also the more or less badly-made statues which are called materialisations, and which are so much commoner in America, where the atmosphere is so much more electrical than it is here." My old lady was a hard-headed old presbyterian, and her idea of the nature of a soul was evidently only a conceit thrown out for her own amusement and the entertainment of her friends. But you will note that it is quite otherwise with her critic. As, probably without putting much more faith in the idea than the old lady herself, he still reasons upon it as a possibility, and endeavours to point out wherein it differs from other so-called spiritualistic phenomena, and bases his objections to a soul being likened to a floating luminous kidney, not on any idea of its improbability, but on the fact that this conception is inconsistent with certain other spiritualistic phenomena which he has obviously studied with some care, and which have undoubtedly influenced his own idea of a soul. Evidently my friend would have rejected the old lady as an unsatisfactory medium, and yet her crude conception of a soul is quite within the limits of sanity, while the specious and fallacious reasoning of her critic shows that on certain points he is—or rather, I am sorry to say, was—undoubtedly a denizen of borderland.

A good many years ago I came across two middle-aged ladies who both asserted their belief that they were doomed to everlasting punishment. This belief was too much for one of these ladies. She could not stand the continual strain of such an ever-present terror, and consequently endeavoured to settle the matter definitely by attempting to put an end to herself, and was, very properly, promptly consigned to an asylum. The other took no such serious view. She played with the idea, and dangled it before her immediate relatives as an interesting horror to which she was about to be unjustly subjected. It was, however, a real belief, and led to prolonged insomnia; but she kept herself sane by widening her interests, and taking, as we might say, an intellectual view of the situation. She regarded her own unjust punishment as only one phase, and indeed, to do her justice, as a comparatively minor phase, of the gross injustice with which, in her opinion, the world was ruled. For two hours every forenoon she retired to her own room, and, as I understood, relieved her feelings by expressing in no measured terms her own idea of the

state of matters. This condition lasted for years; yet during all this time this lady took her position in society. No one unaware of the facts would have noticed anything remarkable about her, while her strong sarcastic humour made her at times a most agreeable companion. This lady presented many other peculiarities. There were few clergymen of note whom she had not attempted to pose with the time-honoured problem as to the origin of evil, a problem, you may remember, to which even Robinson Crusoe had no reply when Friday asked him, "Why God not kill debbil?" Her Bible was a remarkable object: one half was completely expunged as entirely unworthy of belief; a large part of the remainder was shaded off as more or less worthy of further inquiry; while only a small part was left in its original clarity. Wandering all her life in the borderland, this lady has never crossed the boundary, and probably no one but her doctor and her own immediate friends had any idea of her peculiar mental condition. Some may perhaps be inclined to regard this as but an extreme case of hysteria. But there was no evidence of imperfect development of the higher nervous centres,—rather the reverse,—neither was there any indication of impairment of those highly complex nervous processes which form the physiological side of the moral faculties, such as underlie the phenomena of an ordinary case of hysteria. There were, indeed, not wanting signs of ordinary so-called hysteria as evinced by the presence of many more or less imaginary ailments which complicated the case. But the entire syndrome of the case, confirmed as it was by the family history, showed clearly enough that the patient was a denizen of the borderland, and nothing but watchful and loving care and a fortunate freedom from any serious bodily ailment, or any other form of impairment of nutrition, prevented her from crossing the border into the realm of true insanity. There are many such cases, which by a concatenation of fortunate circumstances are able to be treated at home, just as there are obstinate cases of true hysteria which are most readily cured by regarding them as insane and subjecting them to asylum treatment. For example, I was once asked to see a patient who, after a sharp attack of enteric fever, found bed so comfortable that she could not be persuaded to leave it; and as this necessitated the employment of a woman to attend upon her, she was a considerable expense to her parish. I found this woman well nourished, with healthy organs, and every muscle in her body responded normally to the stimulus of electricity. It was hopeless to attempt to treat such a patient in her own home, while no ordinary hospital could be persuaded to receive her. At some personal risk, therefore, I signed a certificate for her removal to an asylum, from which she was discharged cured in about a month.

Another patient was brought to me in a basket—this was long before the days of ambulances—and she had to be brought some

distance. Her history was that she had not walked for ten years, and had not spoken for five. I daresay it has often happened to you, as it has to myself, when called upon to certify as to the mental condition of one hitherto a stranger, to be unable to get a reply to a single question, and to have nothing to notify bearing upon the case, from your own observation, beyond an obstinate taciturnity. Not one word is to be got out of the patient; while all the time of his examination he eyes his examiner with a malignant gleam of satisfaction. But, of itself, taciturnity is not insanity. I have known it regarded as a surgical disease, and treated by transfusion of blood. The operation was successful; but, unfortunately, no one could be found willing to part with his vital fluid except a foul-mouthed blacksmith, and the first word uttered was a bad one. I have not been able to discover what that word was, nor whether the bad language was permanent. Besides, a taciturnity that lasts five years is not likely to be associated with the excitable and unstable brain of a lunatic, though loss of language is common enough in association with cerebral disease, both in the insane and the sane. The patient I have referred to was obstinately taciturn, but she had no cerebral disease; she had plenty of ideas and words too, which she poured forth copiously on paper, writing long letters explaining her condition, and often suggesting treatment. In her own home she had been regarded as a suffering saint; and the clergymen who had been privileged to minister to her spiritual needs were in the habit of removing their shoes before entering her sacred apartment. As she was an entire stranger to me, I kept her for some time under observation before suggesting—which I did most emphatically—that so far from regarding her as a saint, I looked upon her as a modern example of demoniacal possession, adding that I had no doubt I would be able to exorcise her devil, and restore her to her proper position in society. This took some little time, no doubt, but it was so effectually done that she not only walked and talked like other people, but was ultimately happily married. I cannot say that I ever envied the husband, though they seemed always very happy together. There was in this woman an undercurrent of dry humour, which not only helped to keep her sane, but I doubt not made her ten years of seclusion not only no punishment, but a perpetual source of quiet though selfish enjoyment.

Apart, however, from the many who live happily in the borderland, there are not a few who have done good and even great work in their day and generation, notwithstanding that, judged by an ordinary standard, they may be fairly regarded as having crossed the border, and as being quite insane on some one point or other. A well-known couplet has it—

“Great wits are sure to madness near allied,
And thin partitions do their bounds divide.”

But this opinion did not originate with Dryden. It goes back, I believe, to the days of Aristotle; and Seneca certainly puts it quite tersely and definitely when he says, "Nullum ingenium magnum absque dementia est." In my own experience, this idea has found its most apt illustration in cases of *folie circulaire*, in which the patient commences with an acute attack, and returns through a period of depression to a normal mental condition, these attacks recurring more or less frequently during life. An old friend of my own used to be subject to attacks of this character; when well, she was somewhat heavy and dull, but in her acute attacks she was a brilliant talker, and wrote most charming letters. As I had known her from childhood, we had many mutual acquaintances, and the manner in which she hit off the peculiarities of each and detailed their private histories was most amusing. She stuck fairly well to the truth, but sharpened the outline and heightened the colouring of each incident till the ordinary events of a commonplace life were invested with all the interest of a chapter of a sensational novel. It seems unlikely that either Seneca or Dryden had any thought of such a case when they penned the words I have just quoted, but rather that they referred to those many great men in all ages whose beliefs and whose actions have fairly entitled them to be reckoned among the number of the insane. Idiots, demented, and maniacs are undoubtedly insane; but they have no monopoly of mental unsoundness, and the world at large has never recognised how much of its history and progress has been due to those who, judged by modern standards, may be regarded as truly insane.

Among all the great and noble characters of antiquity, there is none so pre-eminent as Socrates. A sculptor of no mean powers, the creator of many statues which have been much admired for the taste and elegance of their execution; a soldier of great activity and courage, two at least of his scholars—Alcibiades and Xenophon—owed their lives to his martial prowess; and possessed of talents greater and more powerful than almost ever fall to the lot of man, he is best known as the founder of moral science. His whole life was spent in doing good, in constantly endeavouring to induce his fellow-men to curb their vicious propensities and desires, and to cultivate and improve their virtues. Both by precept and example, he commended to his fellow-men that dauntless serenity of mind which nothing could disturb or alarm. He divested the study of philosophy of its asperities and technicalities; and the dignity with which he applauded all things just and beneficial gave an importance to his opinions which the purity of his character and the simplicity of his doctrines rendered doubly impressive. To enable men to form just opinions and to make them happy, was the main object of his life; and he was little solicitous about his own fame, or any credit he might deserve as the founder of a new philosophy. His life was spent in pro-

moting the best interests of his fellow-men; and it was laid down at their bidding, but not before he had with great firmness and energy disproved the false and unjust accusations which had been brought against him. Throughout all history, there is no record of a nobler character than that of Socrates; and yet, judged by modern standards, it is impossible to avoid the conclusion that he was insane. Socrates had, as he believed, a genius or demon, whose voice he heard and whose advice he permitted to direct his actions. "By the favour of heaven," says Socrates in the pages of Plato, "there has been bestowed upon me from my earliest youth the most marvellous gift of a spiritual voice, a voice which, when heard, often causes me to abandon what I designed to do, and never advises me wrongly. If any of my friends tells me of any project he has in hand, and the voice is heard, it is a sure sign that this design is not approved of, and ought to be given up." Socrates gives several striking examples of the nature of this warning, and of the results according as the warning was attended to by his friends or the reverse. From these and many similar passages, it is evident that Socrates actually heard a voice that spoke to him and advised him according to his needs. He specially designates it as a voice, the voice, as it seemed to him, of a being other than himself which spoke to him, and not merely his own thoughts or his own conscience to which he had given the semblance of articulate speech. It seems in truth to have been a hallucination of the sense of hearing which Socrates regarded as the voice of a deity, and looked upon as his own special prerogative. He placed implicit confidence in the warnings conveyed by it, and nothing in this world could induce him to do what his demon had forbidden to be done.

Nor was this all. Socrates was also subject to fits of ecstasy or trance, which attacked him at sundry times without warning. Sometimes these seizures attacked him when conversing with his friends, and on one memorable occasion when among his fellow-soldiers at the siege of Potidæa. Upon that occasion he passed a whole day and night standing in the open field in a state of ecstasy, regardless of the astonishment which his conduct excited among his fellow-soldiers, who camped about him all night to watch the end of this singular proceeding. Socrates did not recover consciousness till sunrise on the second morning, when, after a profound obeisance to that luminary, he stalked slowly and silently to his tent.

There is no reason to doubt that Socrates believed he heard a voice exterior to himself which he himself felt sure was that of a god or demon (genius). This voice distinctly uttered articulate words into his ear, and the communications so received were frequent, and were implicitly trusted. Socrates did not merely think he heard a voice—that would be a hallucination of his reason. He actually heard a voice speaking loudly and dis-

tinely, yet no mouth approached his ear and no vibrations reached his tympanum—this is to have a morbid hallucination of the organ of hearing. No one can believe that Socrates actually had communications from a supernatural being, and the only alternatives are either that he was an impostor who made an empty boast of his divine communications, or that he had a true hallucination to this effect. But Socrates was a man of the strictest probity, who devoted his whole life to the discharge of what he believed to be his duty, even though this led to his accepting the poisonous cup of hemlock juice. He was a man of noble thoughts and great power of will, and steadily pursued the object of his mission to an advanced period of life. No imposture could have been carried on so long without the mask being dropped now and then, and no one could have practised deceit for so long without being once and again discovered. Moreover, it is truth alone that gives force to speech, and it is impossible that Socrates could have exerted the powerful influence on his fellow-men which he did, if he had been a miserable impostor playing upon the credulity of those around him. We are therefore forced to believe that Socrates actually heard the voice he supposed was sent for his guidance and direction. But as nothing really spoke—as no voice was sent—he must have been the dupe of a delusion that caused him to give wisdom and a body to words that sounded in his ear alone. This is to have a positive hallucination—a hallucination which in our day might have brought him under the cognisance of the Commissioners in Lunacy. And if we couple the supernatural voice with the remarkable fits of ecstasy or trance to which Socrates was subject, there is every reason to believe that a modern psychologist would have but little difficulty in assigning the affection from which Socrates suffered its proper place in psychological nosology. Even my own limited experience enables me to form what I think would prove to be a fairly accurate idea of the term he would apply; but inasmuch as this has never yet been formally propounded by any one, I refrain from mentioning it, lest my inexperience should land me in the category of those who rush in “where angels fear to tread.”

I have the less difficulty in making such a statement, because modern psychology has made great advances, and the diagnostic characteristics of many forms of mental aberration have been so accurately defined, that, from the records of a fairly accurate biography, it is possible to form a retrospective yet correct estimate of the mental condition of its subject. Such an application of psychology to history is often sufficient to light up some of its most obscure passages, and to explain the origin of motives which, in a seemingly incomprehensible manner, have powerfully influenced mankind in various directions. It cannot be denied that insanity has exercised a most important influence upon the

destinies of nations, as well as on their progress in philosophy, science, and literature. The presence of mental aberration is apt to be overlooked when it happens to coincide with the prevalent opinions or thought of the age, but more closely regarded, it will often be found associated with the greatest and most powerful talents, and to dominate the wills and thoughts of all with whom it comes in contact, not merely at the time, but for many generations. Of this, Socrates, the reformer of Greek philosophy, is a most striking example; and to take another from my own profession, I may mention Van Helmont, one of the greatest medical philosophers of the Middle Ages, whose name I daresay few of you have ever heard, yet the influence of whose thoughts was so great, that more than two hundred years after his death (in 1866), the Royal Academy of Medicine of Belgium offered a prize of 1200 francs for the best estimate of Van Helmont's influence on the progress of medicine down to modern times. Van Helmont was born in 1576, and, having devoted his life to study, he became, as one of his biographers has termed him, the Faust of the seventeenth century. He studied philosophy, law, and theology, but found them all but a weariness of the flesh. He refused the degree of Master of Arts on account of his own ignorance, also a Canonship as he did not feel equal to the duties of such a position. At last, in despair, he prayed to be made what the Lord thought best, and was told in a dream that the Angel Raphael would be always with him to guide and instruct him. After this he studied astrology, chemistry, and *materia medica*, beginning with Dioscorides and the herbalists, finally devoting thirty years to the study of all the medical words then extant. A thorough theosophist, he again prayed to be instructed, and took counsel with his own soul, which appeared to him as a small luminous body in human form. This wonderful being, to which his reason was but a subordinate handmaiden, as he was meditating on the horrible uncertainty of medicine, lifted up its right eyebrow and exhibited a wondrous eye, not composed of coats and humours like a human eye, but a brilliant globe like the planet Venus, which showed him not only his own deep ignorance, but also the error and darkness that prevailed around. Aghast at his own presumption in writing on a subject of which he really knew so little, Van Helmont was about to burn all he had written, when his soul opened its left eye, and showed that such an act would be a piece of the grossest selfishness, and he was warned and admonished in a dream that knowledge like a tree covered with blossom and fruits was the gift of the Almighty, and to be employed for the benefit of mankind. Relying on the help of the angel Raphael and the advice and counsel of his own soul, he studied all the works on medicine then extant—some 600 in number—and devoted ten years to travel and the study of science and medicine in every available country. He was a most accomplished chemist, and among other

discoveries in this science he first propounded the nature and properties of gases, and particularly those of carbonic acid gas. He was no great practitioner, yet his fame was so great that various potentates sought to allure him to their dominions. He emancipated himself from all the schools and prevalent theories of his day, and was the founder of a new and vitalistic theory of medicine, which modified, no doubt, and, with some changes in its terminology, has pervaded all medical science, and has proved its guiding principle down to the present day. Van Helmont's Archeus was the *vis insita* of Haller, the *vis medicatrix naturæ* of Cullen, and has its analogue in the essential characteristics of the organic antitoxines of our own day. While as Van Helmont sometimes regarded and spoke of his Archeus as a ferment, from this point of view it naturally gets linked on to the views and theories of Pasteur, and assimilated to the organic antitoxines on their chemical or materialistic side. From this we see that this Archeus of Van Helmont has a great future before it still, as the organic antitoxines have before them an as yet scarcely realised function to fulfil in the cure and still more in the prevention of disease. Perhaps the most learned man of his day, and one who cared for learning less for its own sake than for the good it enabled him to do, Van Helmont was an enthusiast, a fanatic, and above all things a theosophist, but he was more, he was a dreamer of dreams, a companion of astrologers, of sorcerers, and of witches. He was full of delusions, and the victim of many hallucinations. He had many interviews with the Angel Raphael, and his own soul as a separate entity was his teacher and instructor. From this point of view there are, I daresay, many inmates of asylums not half so insane. I know of one very intelligent and agreeable man, who had to be incarcerated solely because he avowed his determination to kill his wife on account of her High Church and Ritualistic proclivities. Van Helmont lived a long and honoured life, left many discoveries behind him, and, in spite of his insanity, his commanding genius has been so impressed upon the theory of medicine that its influence is never likely to be lost. As the follies and vices of one generation are apt to result in evil to the succeeding one, as the evils of drunkenness are not always so evident in the drunkard himself as they afterwards become in the enfeebled nervous systems of his children, so it is interesting to note that Van Helmont's son was an exaggerated specimen of his father's peculiarities, without inheriting his remarkable brain-power.

It is a trite and often true saying, that *quem Deus vult perdere prius dementit*, but the converse is equally true, that when Providence has any great work to be done He makes some one a little mad about it. Even in our own day we have had some remarkable examples of both truisms; and in past times perhaps the most remarkable instance of that madness which precedes and accompanies the accomplishment of great and notable deeds, is to be

found in the history of Joan of Arc. In the beginning of the fifteenth century the whole of France north of the Loire was in the hands of the English; in 1430, Henry VI. was crowned at Paris, king of France and England, and everything pointed to the speedy expulsion of the Dauphin, son of Charles VI. of France, from the southern part of his dominions, of which he still had a precarious hold, when suddenly the victorious advance of the English was checked; they were ultimately driven from all their French possessions, except the city of Calais, and Charles VII. was crowned king of France, all by the instrumentality of a peasant girl of 18 years of age. This is probably one of the most remarkable episodes in history, and the agency by which it was brought about was even more remarkable than the episode itself, because the whole incident belongs so entirely to the unexpected that it seems quite inexplicable on ordinary principles. It was not an example of the compassion natural to the sex leading to unparalleled self-sacrifice for the protection of the unfortunate, as in the case of Flora Macdonald. It was an unheard-of and almost incredible instance of a girl, still in her teens, casting aside the trammels of sex, and leading to victory a beaten and discouraged army under the influence of what she believed to be divine guidance. Hers was an age, no doubt, in which such a belief was more than usually possible, and Joan's history is but another example of the presence of insanity being overlooked because its manifestations happen to coincide with the prevalent ideas of the day. Joan of Arc was born in a small village in the north-west of France; she was taught to sew and spin, but not to read or write, and was distinguished for her modesty, simplicity, and piety. It so happened that the village in which Joan was born took the side of the French, while a neighbouring village espoused that of the Burgundians, the allies of the English. The boys of the two villages had daily conflicts, so that from her earliest childhood the opposing battle-cries of France and England were for ever sounding in Joan's ears; while an imaginative child, such as she was, could not fail to be impressed by the talk of her elders as to the down-trodden state of her beloved France, and the feelings thus roused could not fail to be still more strongly excited by her friends and companions having, on one occasion, temporarily to flee for their lives from their homes, not getting back for four days. It was small wonder, then, that the voice, which in her 13th year urged her to be modest and pious, gradually became more insistent and more definite as to what she was to do. Wherever she went the voices followed her, and mingled specially with the church bells' chiming. Joan's hallucinations were not of hearing alone; she never heard a voice without also seeing a bright light—both came on the right side. When walking in the woods, Joan heard voices around her, and when listening to the ringing of bells the voices of saints and angels mingled with their chimes.

Gradually her delusions extended to other senses; she saw the Angel Michael, St. Catherine, and St. Margaret; these saints she embraced and kissed, and found they had a pleasant odour. Gradually, too, the voice which at first spoke only of modesty and piety, urged her to hitherto undreamt of acts. "Go," it said, "daughter of God, go, go, go; and I shall be with you to help you—go." This injunction was but indefinite, but it showed how the heaven was working, and ere long the voice became more insistent and more definite. "Joan," it said, "the King of Heaven has selected you for the succour of France and the help and protection of King Charles." As the tide of war rolled on, the prolonged siege of Orleans kept all France in a state of continual excitement, and Joan's voice became more insistent and more definite in its instructions. "Go," it said, "to Robert of Baudricourt, the Commandant at Vaucouleurs, he will help you." At first Robert of Baudricourt was incredulous as to her mission and amused at her simplicity. But the people took her part, bought her a horse, and provided her with male attire. At last her insistence prevailed, and Robert of Baudricourt sent her with an escort to the Dauphin at Chinon. We can imagine the astonishment of the Dauphin when this girl of 18, dressed as a man, came before him with the statement that she had a mission from Heaven to relieve Orleans, and to crown him king of France. The Dauphin naturally hesitated; he kept Joan about the court for some weeks, and had her examined by theologians, and her conduct watched by all the hangers-on about the court. But Joan stood the test. At court she remained the same simple-minded, devout, and modest girl she had always been. From the priests of St. Catherine of Fierbois she received a sword marked with five crosses on the blade, which, she said, her voices had revealed to her was hidden underground near the high altar. Clad in complete armour, mounted on a white horse, with a white banner carried before her, on which were painted the likeness of Our Lady with two angels, each having a lily in her hand, Joan entered Orleans at the head of an armed array of noblemen and men of war. The English feared her as a witch, and did not dare to oppose her; the citizens of Orleans received her as if she were the Deity Himself. Three of the English forts were shortly carried by assault, and within ten days the siege was raised, and the enemy in full retreat. It must have been a most remarkable sight to see this simple maid not only leading her troops to battle and ordering their whole array as if she had been all her life a soldier, but also taking the lead at the council table, and pitting her miraculous voices against the opinions of such able and experienced generals as Dunois, the Bastard of Orleans, Alençon, and La Hire. It is unnecessary to pursue the subject further. Taught by her miraculous voices, and aided by her own unquestionable genius, this girl of 18 dropped the garb of a simple village maid, and, clad in all the panoply of war, sat at the head of the council

table or led her troops to battle as if she had been to the manner born. Charles VII. was crowned king of France at Rheims, and Joan wished to return to her village home, deeming her mission accomplished. At the king's request, Joan consented to remain with the army; but apparently her heavenly directions ceased. She no longer heard unearthly voices, and she began to have fearful forebodings. In no long time she was taken prisoner by the Burgundians and sold to the English, and, after trial and nearly a year's imprisonment, Joan was burned at the stake as a sorceress and a heretic. It seems that in prison her spiritual voices returned, but they no longer urged her to doughty deeds or spoke of triumph and victory. The voices promised that she would be set free from prison, but they never mentioned how, and urged her to "take everything cheerfully," promising that after her martyrdom she would "come at last to the kingdom of heaven."

Her compatriots never spoke of Joan as insane, and her history but affords another example of how readily insanity gets overlooked when its manifestations happen to coincide with the spirit of the age. But there is no doubt as to her delusions and hallucinations. To the last she maintained the reality of her revelations, and she died a martyr to her convictions.

The story of Joan of Arc is a most remarkable one; it affords a very striking example of the influence of delusions upon an excitable temperament, of the fact that hallucinations are often associated with an indomitable will and with considerable strength of intellect, and it is a remarkable instance of the manner in which insanity has moulded history and influenced the fate of nations.

But perhaps the most notable example of the influence of insane delusions upon the history of the world is to be found in the story of Mohammed and of the religion which he founded, a religion which at the present day numbers among its votaries over 160 millions, or about one-ninth of the entire population of the world. Mohammed has been stigmatised as a prophet of deceit, and the religion which he founded has been decried as a suggestion of the devil, and though insanity has been occasionally spoken of in connection with Mohammed, yet it has never been received as an adequate explanation of his conduct or procedure; and one of those who have most recently written of him—one, too, who by his training and studies ought to be a most competent judge—distinctly says, "I cannot call him insane." Nevertheless I venture to differ from this opinion, and to say that Mohammed was even more unmistakably insane than Joan of Arc, and that the religion which he founded was the product of his insanity, modified by his own commanding intellect and by the spirit of the age in which he lived. Mohammed was born towards the end of the seventh century, at a time when, under the influence of Judaism on the one hand, and of Christianity on the other, the ancient pagan

creeds were fast crumbling away. Paganism in all its forms may indeed be said by that time to have ceased to be a living faith, and was only clung to by the people as a sacred inheritance from their forefathers. Already there were many prophets in the field who proclaimed the futility of the ancient pagan creeds, and who taught the unity of God, the religion of Abraham. Some sought to combine the more noble forms of paganism, such as the worship of the heavenly bodies, with this purer doctrine, while others turned aside to Judaism on the one hand or to Christianity on the other. Mohammed was a true child of his time, influenced more or less unconsciously by the many contradictory views which all his life had been seething around him. He was 40 years of age before he took up the rôle of a prophet himself, and sought to find a new faith which should take the place of idolatry, and yet be distinct from either Judaism or Christianity, and in this his delusions and hallucinations undoubtedly aided him, if they did not, as is probable, primarily start him on this quest for a new religion.

Ordinary epileptics are not generally very interesting subjects; so far from being associated with any manifestation of genius, the intellect, under the influence of repeated attacks, tends to become rapidly debased.

But there are some epileptics who retain all their faculties apparently unimpaired, notwithstanding the persistence of epileptic attacks from early youth, and in some cases in spite of the occurrence of repeated maniacal attacks. For we know that an epileptic attack is occasionally replaced by an outburst of mania, which may last for some time, or be as sudden, as violent, and as evanescent as a fit of epilepsy itself.

While there are many whose faculties remain unimpaired by the continuance of epilepsy, there are a few who, at all events during its early stages, develop a peculiar aptitude for certain forms of learning or of work, though commonly this special intellectual sharpness ere long disappears under the degrading influence of the disease. I myself was well acquainted with one lad who developed quite a genius for the solution of arithmetical problems, and also for making patterns for fretwork, in neither of which was he anyways proficient in his pre-epileptic days, and they were gradually lost in the progress of the disease. The morbid religiosity of epileptics forms a well-known element in the syndrome of the disease. It is the one form of disease in which exaltation of the religious sentiments is most frequently observed, associated with a marked laxity of morals. But apart from this morbid religiosity we often find epilepsy associated with hallucinations of various kinds, affecting sometimes the sight alone, and sometimes the hearing alone, and sometimes both sight and hearing. You all, no doubt, remember Dr. James Gregory's patient, in whom the epileptic aura was replaced by the figure of a

little old woman in a red cloak, who seemed to walk up to him and strike him down with her crutch. About the middle of this century, the late Professor Alison began to suffer from severe epileptic attacks. These seizures were followed by delirium of a very violent and acutely maniacal character, but during the fits he seemed lost in the contemplation of some blessed vision; he thought he was in Elysium, and he believed he heard the praises of the heavenly host, and amongst them he heard the voices of many long-lost friends whom he recognised and with whom he conversed, so that it was a matter of regret to him when he recovered consciousness of the external world. These remarkable attacks were thus accompanied by hallucinations of sight and hearing, of the reality of which Alison at the time entertained no doubt, and they were followed by acute maniacal attacks, during which he was undoubtedly, though only temporarily, insane.

Now we learn from the history of Mohammed: that he was epileptic from childhood; as in other epileptics, the fits were often followed by periods of prolonged unconsciousness, during which he had hallucinations of sight and hearing. He saw the Angel Gabriel, who conversed with him, and who, he believed, revealed to him sentence by sentence the contents of his sacred book, the Koran, which contains regulations for both the civil and religious life of his followers, while even the pleasures promised them in the next world were evidently dictated by the impulses so distinctive of epileptic religiosity. There can be little doubt that Mohammed was insane, and as Alison's insanity bore the impress of a highly educated and deeply religious Christian, so that of Mohammed is distinctly stamped with the spirit of the age in which he lived, when all around him there were prophets and leaders of men seeking to turn the hearts of mankind from the old polytheism which was crumbling away, to a purer monotheistic religion. Mohammed's wife and some of his relations, to whom he had revealed his earlier hallucinations, encouraged him in the belief that he was favoured of Heaven, and set apart as the prophet of a new religion, which, though modelled on the monotheistic doctrines of the age, is as distinctly modified by his own powerful and practical intellect. More than 1200 years have passed away since the death of Mohammed, yet the religion which he founded is still a living faith to more than one-ninth of the population of the world; and if we acknowledge that Mohammed was insane, and I do not see how we can avoid this conclusion, then we must also acknowledge that the prevalence of Mohammedanism affords one of the most remarkable instances of the manner in which insanity has modified the kingdoms of this world and has influenced the progress of humanity.

Thus far I have endeavoured by selected examples to show how much mankind has been indebted for its progress in philosophy and science to those who—if not actually insane—have certainly

been dwellers in the borderland of insanity, while a similar influence has had most important results in the domains both of arms and of religion. If we turn now to the realm of letters, we shall also find that some of the noblest works in literature have been produced by those who have all their lives dwelt in the borderland, while some of the noblest conceptions of the human mind have been scrawled by a madman on the walls of a madhouse. In seeking for examples illustrative of the influence of this peculiar phase of mentality upon human progress as revealed in literature, we are met by a perfect *embarras de richesses*—more so, perhaps, than in any other department of human knowledge. Probably because all literature is the product of individualisation, and no one can individualise his thoughts without at the same time exaggerating their peculiarities. I have been more struck with this in the literature of psychology than in that of any other subject, and I am inclined to attribute this marked character in psychological literature to the influence of environment, so well known as one of the most important agents in modifying the development both of mind and body. I shall not, however, pursue the subject further in this direction, nor shall I be tempted by any modern illustrations, but shall at once carry you back a couple of hundred years to Jonathan Swift, Dean of St. Patrick's Cathedral, Dublin, the greatest of English satirists and the most original writer of his day. It is surely a splendid triumph of genius that "Gulliver's Travels," written as satires to excite and gratify the political feelings of men, should 200 years later still survive and be loved as the most delightful of fairy tales by the children of their descendants. Swift's "Tale of a Tub" was one of the most powerful religious satires of the eighteenth or of any other century. His "Drapier Letters" caused the Government of the day to give up their purpose of flooding Ireland with the copper coinage of an English patentee, and created so great an excitement in Ireland as to raise the unknown author to the pinnacle of fame. Two rewards of £300 each were offered to any one who would unmask the author of these letters, but the secret was well kept, and not a traitor could be found to sell him. Not to be prolix, I will only mention one more of Swift's writings, his "Modest Proposal," in which he suggests that the distress of the poorer Irish might be relieved by employing their children as food for the rich, and which is a perfect masterpiece of satirical irony.

Swift died at the age of 78, and the last three years of his life were passed in almost total silence and in the charge of keepers. One of his biographers suggests that the cerebral disease of which Swift died, and which ended in complete dementia, must have lasted for fifty-five years, and there is some reason to think that this estimate is not far wrong. Swift was deaf, and was subject to attacks of giddiness, and a comparatively recent writer has claimed that the cerebral degeneration which was ultimately fatal

was an extension from the peripheral disease of his ear. I am not aware that modern pathology would sanction any such assumption. Swift himself had a clearer conception of the nature of his disease, when, pointing to the withered boughs of a decaying elm, he said to his companion—Dr. Young—"Like that, I shall die at the top." His disease was no doubt peripheral, but it affected the periphery of the brain, and did not originate in any other organ. All his life Swift was liable to severe—almost maniacal—paroxysms of temper, which doubtless were early indications of that degeneration which ultimately ended in complete dementia. This tragic close, to which Swift so pathetically alluded, seems to have shadowed all his life; he was subject to fits of maniacal excitement alternated by periods of intense mental depression, estrangement from his friends, increasing giddiness, and a tottering gait, gradual loss of vision, loss of memory for words, and ultimately total silence. I have not touched upon Swift's relations with Stella and with Vanessa; the mystery in which these relations are involved is indubitably connected with Swift's mental malady, but its elucidation necessitates too minute and searching an inquiry to be entered upon now. It is enough for my present purpose if I have succeeded in showing that one of the greatest literary geniuses of our country was all his life a denizen of the borderland, and had formally crossed the border years before he ceased to be mortal.

Swift was a poet, but rather mediocre; it is as a satirist that he will live. On the other hand, William Cowper was a great prose writer, and his letters are amongst the most charming compositions in the English language, but it is as a poet that his name will descend to generations yet unborn. For who can imagine a time when the infant mind will cease to be amused by the adventures of "John Gilpin," or the patriotism of the schoolboy fail to be roused by the words of the dying Boadicea—

"Regions Cæsar never knew
My posterity shall sway;
Where his eagles never flew,
None invincible as they"?

poems not of the very highest or most philosophic stamp, but which appeal at once to the sense of humour and of patriotism innate in every human breast. Simple and natural Cowper's poems were a great change from the stilted language and far-fetched imagery of his predecessors, and it was these very qualities which won their way into the hearts of all when they were first published, and has kept them afloat upon the stream of time for more than one hundred years. It is not the fashion to read Cowper nowadays, but quotations from his poems are more in use than from any other author except Shakespeare. His hymns have exercised a greater influence upon evangelical religious life than those of any other hymn-writer save John Wesley; and probably more tears have been shed over his lines

"On the Receipt of my Mother's Portrait," than over any other poem in the English language. Cowper's longer and more didactic poems are full of graphic pictures of simple country life and habits as they existed last century, coupled with moral and religious reflections, of the highest character, seasoned with the Attic salt of fervid satire. Last century Cowper was regarded as one of the greatest poets of the day, and no one can deny that he occupies even yet a very high place in English literature, and yet all his life Cowper was a dweller in the borderland.

A delicate, sensitive boy, Cowper had the misfortune to lose his mother when only a child of six; his school life was embittered by the tyranny of his class-fellows, and a deeper melancholy was impressed upon his timid diffidence. At 21, Cowper was called to the Bar, but never practised. He was ultimately offered the office of Clerk of the Journals of the House of Lords. But he shrank from the needful examination at the Bar of the House, as well as from the publicity of the office. At this time his misery was so great that he thrice attempted suicide, and had to be placed in seclusion for about a couple of years. Throughout the most of his after life Cowper enjoyed, thanks to the kind attention and cheering influences of many friends, a measure of tranquil happiness, though at the age of 40 he had a second period of five years of the deepest melancholy, from which he again recovered. It was after this recovery that Cowper published the first volume of his poems; it is known that many of his hymns and minor pieces were written when he was in a state of the deepest dejection, and it is highly probable that many of his longer pieces were being thought out, if not actually composed, when he was still in confinement. On the death of his kind friend, Mrs. Unwin, Cowper fell into a state of the most profound melancholy, and though he kept his ailment at bay by continuing his translation of Homer, and otherwise employing his poetical talents, he died seven years later, protesting at the last that he was plunged in "unutterable despair." A very striking example of how much the world owes in its literature to those whom it stigmatises as insane. I need not multiply examples, they are easy to be found, and as common as blackberries. I shall only give one more, and that chiefly for the sake of the remarkable contrast between the nobility of the thoughts expressed and the circumstances under which they were produced.

Christopher Smart, well known as a translator of Horace and as the winner of the Seatonian prize at Cambridge during five successive years, was a Fellow of Pembroke College, Cambridge, but closed this connection by marrying. This necessitated his removal to London, where he became a friend of Garrick and of Johnson, but with all his talents and all his exertions he failed to keep poverty from the door. The tendency to depression present throughout his whole career was aggravated by disappointment

and debt, and Smart was first placed within the rules of King's Bench, and ultimately in an asylum, where he died.

On the wall of his asylum, Smart, with a bit of charcoal, scrawled the following noble thoughts, forming part of his "Song of David"—

"He sang of God, the mighty Source
Of all things, the stupendous Force
On which all strength depends;
From whose right arm, beneath whose eye
All period, power, and enterprise
Commences, reigns, and ends.
The world, the clustering spheres He made,
The glorious light, the soothing shade,
Dale, campaign, grove, and hill,
The multitudinous abyss,
Where Secrecy remains in bliss,
And Wisdom hides her skill.
'Tell them I AM,' Jehovah said
To Moses; whilst earth heard in dread,
And smitten to the heart,
At once above, beneath, around,
All Nature, without voice or sound,
Replied, 'O Lord, Thou art!'"

I think I have given you a sufficient number of examples to show that in every department of human progress, in philosophy, science, arms, and literature, insanity has exercised a most important influence, and we are now entitled to ask, has this remarkable effect been produced by the insanity, or has the apparent coincidence been purely accidental?

Now this is too interesting, and in many ways too important a subject to be rashly dogmatised upon, and there is much to be said from both points of view. First, we cannot forget what Abercrombie has said:—

"A remarkable peculiarity, in many cases of insanity, is a great activity of mind, and rapidity of conception,—a tendency to seize rapidly upon incidental or partial relations of things,—and often a fertility of imagination, which changes the character of the mind, sometimes without remarkably distorting it. The memory in such cases is entire, and even appears more ready than in health; and old associations are called up with a rapidity quite unknown to the individual in his sound state of mind. A gentleman, mentioned by Dr. Willis, who was liable to periodic attacks of insanity, said that he expected the paroxysms with impatience, because he enjoyed during them a high degree of pleasure. 'Everything appeared easy to me. No obstacles presented themselves, either in theory or practice. My memory acquired, all of a sudden, a singular degree of perfection. Long passages of Latin authors occurred to my mind. In general, I have great difficulty in finding rhythmical terminations, but then I could write verse with as great facility as prose.' 'I have often,' says Pinel, 'stopped at the chamber door of a literary gentleman, who

during his paroxysms appears to soar above the mediocrity of intellect that was familiar to him, solely to admire his newly acquired powers of eloquence. He declaimed upon the subject of the revolution with all the force, the dignity, and the purity of language that this very interesting subject could admit of. At other times he was a man of very ordinary abilities.'” And, secondly, we must not forget that, as mental influence alone is of itself sufficient to give rise to stigmata and to other morbid affections, especially in a certain class of patients, so the general prevalence of any special excitement, such as the English invasion of France in the days of Joan of Arc, or the religious transition of the days of Mohammed, may give rise to special forms of cerebral excitement quite apart from the presence of insanity, but which may also be variously modified by the co-existence of special delusions.

EXPERIENCES WITH THE MEDICAL DEPARTMENT OF THE ARMY IN THE SOUTH AFRICAN WAR.¹

By JOHN CHIENE, F.R.C.S.Ed., *Professor of Surgery in the
University of Edinburgh.*

In bringing before the Society my experience in South Africa, I must keep in mind that my stay there was divided into two distinct periods, from the beginning of April until the end of June, from the end of June till the end of August; from Cape Town to Norval's Pont in the first period, from Norval's Pont back to Cape Town in the second period. At first I was simply a consultant, who advised in individual cases; afterwards the allegations regarding the Army Medical Department had reached Africa, and it was evident that other questions would necessarily occupy my attention.

These questions are still *sub judice*, and cannot yet be discussed. Whatever may be the verdict of the Commission, every one must allow that the question of Army Medical reform is only a subsection of the wider question of Army reform.

I purpose saying a few words regarding the lessons which I have learned in the hospitals in South Africa. I will speak of these lessons under the following heads:—*Ambulance, Anæsthesia, X-rays, Hospital trains and ships, Bullet wounds, Injuries of the head, Injuries of blood vessels, Injuries of thorax and abdomen, Medical cases, Sanitation, Burning v. Burying*, and then close with a word on the *Work of the civil surgeon in South Africa*.

The four great hospitals in the neighbourhood of Cape Town were Wynberg No. 1, Wynberg No. 2, Rondebosch No. 3, and

¹ An Address delivered to the Edinburgh Medico-Chirurgical Society.

Woodstock No. 4. Much has been said about Woodstock. It is an old building near Cape Town, lying on the shore, and, like all old buildings in South Africa, it was infested at one time with animal parasites, which gave rise to much discomfort. On my second visit great improvement had taken place in this particular. I never noticed any smell from the town drains, which opened into the bay in the vicinity of the hospital. The drain for surface water was a short one. The drain for sewerage opened 300 yds. from the shore, and the current carried the dejecta away from the hospital, and, judging from the excellent results of the surgical cases which I saw there, I cannot look upon the hospital as an unhealthy one.

The dejecta from the hospital, after being mixed with izal, were buried in a trench on the shore. I examined these trenches, and found no smell whatever.

My time was principally spent in the Wynberg and Rondebosch Hospitals, two days a week to each hospital. Both were on excellent hospital sites.

Let me first say a word regarding the conveyance of the soldiers from the trains to the hospitals. As I lived at Wynberg, I saw them arrive by train, and I saw them immediately after admission to the hospital. Every one must clearly differentiate between hospital trains and ordinary trains carrying invalids. In the former, the soldiers were most comfortable; in the latter it was very often the reverse. I am fully satisfied that in the future some form of portable cooking-stove must be carried in these ordinary trains, by means of which simple food may be cooked for the soldiers. You cannot trust for a supply of food at the stopping places. It was often very sad to see how worn and weary the poor fellows were on their arrival. Much was done for them at the Wynberg Station by good, kind ladies, who were always in attendance. They must, if possible, in future campaigns be well fed on the journey.

As regards their conveyance from the trains to the hospital, at Wynberg this was done in ambulance carts. On a smooth road an ambulance cart is fairly comfortable; but, in my opinion, the McCormack-Brook ambulance litters are certainly more comfortable than ambulance carts, and I think it will be a question of the future if these litters should not take the place of carts in the conveyance of patients from trains to hospitals. I came across a member of the Imperial Yeomanry who had been in both as an injured man, and, in his opinion, there was no comparison in the relative comforts. We see the same thing in civil life—the greater comfort of the litter as compared with the waggon. These litters were on Rickshaw wheels, with rubber tyres, and worked most smoothly.

A question for the future will arise, can any improvement be made on ambulance waggons for the removal of patients from the

battlefield to the nearest hospital? The Boers used, as a rule, waggonettes and Cape carts.

I have frequently heard our soldiers say that they would rather travel in an ox waggon than in an ambulance cart. Surely some improvement could be made. Possibly an open competition would teach us some lessons as to the best form of ambulance waggons. The essentials are strength, easy turning, easy motion, and the patients easily reached by the attendant. The stage coaches in South Africa are hung on leather. No doubt they are the results of evolution and the survival of the fittest; and many think that the old-fashioned leather springs are worthy of trial for ambulance purposes. The swing of the carriage must not be too great, for fear of sickness analogous to sea-sickness.

Anæsthesia.—Chloroform was the favourite drug. Ether and A.C.E. were in occasional use. I never saw any trouble with any form of anæsthetic. A little struggling, but no sickness at the time, and very little afterwards. Can the sickness in civil life be a nervous condition which does not hold good amongst soldiers in time of war? I am fully satisfied that the soldier accepts without demur any decision which is come to as regards his treatment. He is contented, and asks no questions. "All right, I am ready," is his answer. He reminds me of the condition of mind in a patient suffering from shock — not taking much interest in his own case. I speak of the soldiers that I saw at the base, long after their injuries had been received; they seemed still to be suffering from chronic shock, if I might use the term. Their nervous system had received at the time of the accident, a shock from which they had not recovered. I can only recall one case of a soldier who refused to be operated upon. How different it would have been in civil life. How often is your advice not taken, possibly because the civil patient has a larger choice of doctors, and goes from one to another, seeking advice until he gets that which agrees with his own or his friends' view of the case. The soldier is alone, has no meddling friends, is trained to obedience, and looks on the doctor as one whom he can trust. The other day, Dr. Lorans, Medical Officer of Health for Mauritius, was in Edinburgh on a holiday. When I spoke to him of the ready acceptance of the soldier when operative treatment was suggested, of the ease with which chloroform was taken, and the absence of all anxiety during its administration, he told me that he was much struck by both of these things happening after the dreadful typhoon which visited Mauritius in April 1892. In consequence of it, many operations were necessary on those who had been injured. The Indian population in the island, in times of quiet, raised many objections to operations. On this occasion every one was most amenable, and no objections were made. The condition of the patients greatly facilitated the administration of chloroform.

The X-rays.—Great difficulties were often experienced in localising bullets in the spine and pelvis. In the limbs little difficulty arose. In the pelvis a rectal examination will sometimes localise a bullet, when the X-rays have been found wanting. I am satisfied that the efficient use of the X-ray apparatus depends very much on the experience of the man who uses it. In some hospitals much want of trust, in others full belief; in the former inexperienced operators, in the latter capable fellows who could localise a bullet without doubt or demur. Mackenzie Davidson's method gained most acceptance.

Another thing which was very evident in South Africa was the distinct division of patients into two great classes—those who were anxious to go home, those who wished to go back and fight. The first were all septic cases, the second aseptic ones. Dysentery is the disease which most takes the heart out of a man. In the hospitals I saw no one who had not a strong opinion one way or another.

Hospital trains and ships.—I am very anxious that my hearers should fully understand the great value of hospital trains and hospital ships. In Natal the absence of corridor carriages rendered the Princess Christian's hospital train of much value. Most fortunately it was ready just in time to cross the Tugela and bring back the sick after the relief of Ladysmith. Colonel Forrester, educated in Edinburgh, was then in charge. Shortly afterwards he was seized with typhoid fever, which occasioned his death.

In Cape Colony there were four trains with every comfort; two of them under the care of Edinburgh men, Major Simpson and Captain Fleming, D.S.O. The good that these trains did is incalculable. Kipling has written of them. I wish his articles which appeared in the *Cape Times* and in London papers could be reprinted in a separate form. To my mind they gave the best idea of the true condition of affairs.

As regards the hospital ships, I had no experience of those fitted up at home, but I saw two of the sick ships fitted up in Durban, the *Lismore Castle* and the *Simla*, and I am sure nothing could be better. Every comfort and every convenience, and it is especially interesting to note that, as regards the Durban ships, they were fitted up by naval officers, with no special experience, assisted by Major MacCormack. I have heard it said that when these ships went home they were the envy of the skilled artificers who had fitted up the hospital ships at home. Colonel Gallwey, the energetic head of the Natal Medical Service, looked on these ships as base hospitals. They contained 1660 beds, and were a great help in relieving the congestion in the hospitals on the lines of communication. When I mention Colonel Gallwey's name, I cannot but recall the valuable work done by the Indian Bearer Company inaugurated by him. All spoke well of their bravery and gentleness.

It has to be remembered that the problem in Natal was a much easier one than that in Cape Colony—50,000 men as compared with 150,000; 200 miles of railway as compared with 1000. These two factors alone made all the difference.

Bullet wounds.—A very interesting question was constantly raised, when a soldier was struck at a near range the wound was worse than when received at a distance. Between 200 and 400 yards a more ragged wound resulted than when the soldier was struck at 1000 or 1500 yards. Possibly the bullet is like a top, at first it spins round a centre, and then after a time it settles down into its true course. In Johannesburg I saw several cases of severe brain injuries often very fatal. In one night three were admitted, and all died. I see in the papers that these injuries are explained by expanding or explosive bullets. Such bullets were undoubtedly found in the bandoliers, but I think the cases must be divided into two groups—first, those in which the bone and brain are severely injured and torn; second, those in which with a comparatively small bone wound the brain is much torn. In the first the injury is probably, if no shrapnel is being fired, due to expanding or explosive bullets. In the second the Mauser bullet may be the cause when fired at a short range.

As regards the poisoning of bullets, I brought home some of the green-coated bullets, and Dr. Hugh Marshall, in the chemical laboratory, has kindly examined them, and given me the following interesting report:—

“EXAMINATION OF GREEN-COATED CARTRIDGES (MAUSER) FROM MAFeking.—The coating extends from near the tip of the bullet up on to the shoulder of the case. It has not been applied by dipping, but apparently by smearing the molten material backwards and forwards along the cartridge.

“The coating is fatty or waxy in appearance. Over the bullet it is of a uniform green colour and opaque, but over the case the colour is irregular, and the yellow colour of the brass is distinctly visible in small patches through the coating; when examined by means of a lens, the colouring matter is here seen to be in the form of small spots distributed more or less thickly through a slightly coloured mass.

“When the coating over the bullet is carefully scraped off in very thin layers, it is at first found to be colourless, forming a white greasy powder. Some distance below the surface the green colouring is reached, continuing right down to the surface of the bullet.

“The colourless material melts at about 47° C., and is easily saponifiable by alkalis. It has a distinctly acid reaction.

“The green-coloured portions, when examined chemically, give well-marked copper reactions.

“The bullets in these cartridges are composed of an outer steel envelope, plated inside and out with an alloy consisting principally, if not entirely, of copper and nickel, and filled with a lead core.

“From the facts stated, it is evident that the green colouring matter was not originally present in the coating, but has been derived from the

metal. Probably the cartridges were simply coated with suet or tallow for the purpose of lubricating the rifle barrel. In course of time, the fatty acids originally present, and which would increase in quantity on keeping, have attacked the underlying metal, forming green-coloured copper salts which have gradually spread through towards the outer surface of the fatty material. Apparently the copper is more easily abstracted from the copper-nickel plating of the bullet than from the brass of the case.

"From the point of view of those against whom the ammunition is employed, there can be little difference between such coated cartridges and those which have not been so treated; from one cause or another, the coating is fairly certain to be completely removed before the bullet reaches its billet.

HUGH MARSHALL.

"UNIVERSITY OF EDINBURGH, October 10, 1900."

Head injuries.—My experience of cerebral herniæ before I went to Africa was very unfortunate; cases rarely recovered. In Africa the majority of the cases that I saw were on a fair way to recovery, and in some the recovery was complete. The antiseptic treatment, in my opinion, could not fully account for it. Possibly it was the larger opening in the bone, because my experience has been that if a hernia appears at a comparatively small opening it goes on growing, and the best chance for the patient is to increase the size of the opening in the skull. The intracranial pressure acts like a wedge, and the larger the opening the less the pressure. Dr. Louis Irvine, a civil surgeon at Port Napier, Pietermaritzburg, spoke of the good results of formalin in cases of cerebral hernia. He used solutions varying in strength from 5 per cent. to 25 per cent. These solutions acted by drying up the mass, and were at the same time antiseptic.

I saw several cases of severe brain injury followed by recovery. At Wynberg, a patient, when lying on his abdomen, was struck by a bullet on the right temporal region, which passed downwards, forwards, and inwards, into his mouth, through the hard palate opposite the right canine tooth. He made a good recovery. In Johannesburg I saw a man in whom a bullet passed transversely across the brain in the frontal region without bad consequences. At Rondebosch I saw a very interesting case, in which a bullet was removed from the left temporal fossa above the base of the mastoid process. It had been localised by the X-rays. It entered the skull to the left of the middle line, passing through both occipital lobes. A right hemianopsia resulted. The curious thing about the bullet was that, when removed, the base of the bullet was next the bone, the apex of the bullet looking in the direction of the line of fire. I remember seeing at Woodstock a Boer prisoner who had lost by a shrapnel accident a large area of his skull. When I saw him the wound was healed, but the bone was not restored, and as he was a middle-aged man, there was little hope that ossific formation would take place. I suggested,

in order to prevent injury to the pulsating brain, that he should wear a shield of Britannia metal. He smiled, and replied that "he had had enough of that metal."

Injuries of blood vessels.—I saw several cases of arterio-venous aneurysm in the South African hospitals. They occurred in the neck and extremities. Much improvement resulted from proximal ligation of the main artery, when the communication was between the carotid artery and internal jugular vein. In the thigh, ligation of the femoral artery did good. In the leg, the aneurysm as a rule was laid open, and the artery and vein ligatured above and below the opening. As far as I could judge, the cases were more allied to aneurysmal varix than varicose aneurysm, but there was not the great dilatation of the vein which is commonly described in such cases. Possibly the cases were too recent, and the venous dilatation occurs at a later date. I had no opportunity of making a dissection of any of those cases of arterio-venous aneurysm in the neck, but the improvement that took place after proximal ligation of the main artery with the absence of any venous dilatation, made me wonder if the condition could be due to bruising of the artery and vein, and subsequent matting with constriction. No one could avoid noting the number of cases of painful neuritis from bruising of the nerve, the cases of neuritis due to adhesion of the nerves to bone after fracture, and the cases of neuritis due to splinters of bullets lodged in the nerve, without thinking that possibly the same thing might have occurred to arteries and veins lying side by side, and giving rise by matting and constriction to symptoms similar to those met with when there is a communication between the artery and the vein.

One case of arterio-venous aneurysm in the neck made a deep impression on me. The bullet had passed through his neck from side to side, the track of the bullet passing behind the trachea and behind or through the œsophagus. There was a pulsating tumour low down in the neck immediately above the clavicle, so low down that nothing but distal ligation of the carotid could be attempted. He developed enteric fever, and was invalided home. I heard of him recently, in Devonshire, jumping a 6-foot wall. No operation had been performed.

I may mention a strange coincidence in relation to arterio-venous aneurysm. Two brother-officers in one regiment were wounded in the same battle. In one the bullet entered on the right side, 2 in. below the angle of the jaw, the wound of exit being at a corresponding point on the opposite side of the neck. In the other, the track of the bullet was the same, the course reversed. In both an arterio-venous aneurysm developed near the wound of exit. They were taken off the field in the same ambulance, and brought down to Wynberg. Mr. Makins operated, ligaturing the common carotid in both cases, with very decided improvement. In false aneurysms the sac was

laid open, and the artery tied above and below the bleeding point.

Injuries of thorax.—In lung injuries I was struck with the rarity with which the patient said that he spat blood at the time of the accident. Apparently the Mauser or Lee-Metford bullet passes through the lung, searing it and preventing hæmorrhage. On the other hand, it must be noted that in many cases there was hæmothorax probably from the intercostals, and most of the surgeons were agreed that if the blood was slowly absorbed, tapping assisted absorption, and there was also general agreement that a rise in temperature was the first indication that absorption had commenced. Possibly this rise is analogous to the rise we see for a day or two after an extensive operation, due to absorption of the products of metabolism. Empyema as a result of lung injuries rarely occurred. I only saw four cases. I saw several cases of penetrating thoracic wounds in which, after careful examination of the apertures of entrance and exit, I could not but come to the conclusion that the bullet had traversed the heart. I can only express this as my opinion. I earnestly hope that a careful tabulation of all these cases will throw some light on the effects of the Mauser on the viscera, lungs, intestines, heart. In all the cavities I saw wounds which, from my former experience, would have certainly proved fatal.

Abdominal injuries.—I had no opportunity of forming an opinion on the question of immediate operation in penetrating wounds of the abdomen. I can only say that I saw several cases in which complete recovery had taken place without operation. It was currently believed that the hungrier a man was the less his risk in an abdominal wound. I saw one case at Kroonstad in which the wounded bowel had been excised, and I heard of another successful case in Natal. As in the lung, so in the intestine, apparently the Mauser bullet makes so small a wound that neither bleeding nor extravasation occurred. I can explain the recoveries after penetrating wounds in the abdomen in no other way. I saw in Wynberg two very interesting cases of penetrating abdominal wounds, in which a large hæmatoma formed in the iliac fossa. In one, the abdomen was opened and the clot expressed; in the other, absorption took place.

In one case the bullet traversed both thoracic and abdominal cavities without evil consequences. It entered above the left clavicle, and was removed from Scarpa's triangle on the right side.

After I left Wynberg, I was brought in contact with a new state of affairs. To a great extent, in Kimberley, Bloemfontein, and Kroonstad, almost entirely in Johannesburg and Pretoria, the sick and wounded were in hotels, churches, and halls, and if there was free ventilation and the rooms were large, they made excellent hospitals, but tents and hospital huts are better than houses. In speaking to the students at the beginning of the

session, I referred to what seemed to me a matter of very considerable importance. The purification of these buildings must be very thorough. Many South African friends expressed to me their fear of the coming year, and they anticipate a great outbreak of enteric in the near future. This will be a very serious affair, looking to the flood of emigrants, new to the country, who will rush north whenever they get the chance. I think there should be no delay in sending out the best incinerators, and compelling the authorities to burn the dejecta. Burying is common in Cape Colony, in the Orange River Colony, and Transvaal. In the three large hospitals in Natal, Escourt, Mooi River, and Howick, the dejecta were burned. At Johannesburg I made a careful examination of the methods used in burying. I found all the Kaffirs who removed and buried the dejecta in good health, and in a very short time the earth in the trenches in which the burial had taken place resumes its normal appearance. Still I cannot help thinking that burning is infinitely preferable, and I trust that it will soon become general throughout South Africa. There should certainly be incinerators at all the railway stations, to burn the dejecta from the hospital trains.

We will, I trust, hear from Dr. Boyd his experiences on typhoid and dysentery, but I may be allowed to say that phlebitis of the common femoral vein was a frequent complication in enteric, delaying recovery. I did not hear of any fatal results from it. Patients with typhoid died from exhaustion or hæmorrhage, rarely from perforation.

There is much difference of opinion as to the merits of typhoid inoculation. It will be some time before the results can be tabulated, because the medical sheets of the soldiers did not accompany them, and no definite data could be attained, more especially from those who were admitted into the hospital in a moribund condition.

There is a fever in the nomenclature of disease used in the Army called "Simple continued Fever." Many hold that it is aborted typhoid, and at Estcourt Hospital I was informed that five out of six cases reacted to the Widal test. Had these patients been inoculated for typhoid, and was the reaction due to the inoculation?

The Widal reaction test was not in use as a rule in the military hospitals. It is from the civil hospitals that we will hear regarding its value as a diagnostic.

As regards dysentery, I was struck with the great depression of spirits of the patient. The treatment by the free use of sulphate of magnesia followed by ipecacuanha was the favourite remedy. Dr. Watkins Pitchford, a civil surgeon at Estcourt, strongly recommended the use of izal along with bismuth and chlorodyne in dysentery. He has described the treatment in the *British Medical Journal*, 10th Nov. 1900. He used it on

the suggestion of Dr. Crossland, a civil surgeon on duty at Estcourt.

Abscess of the liver sometimes followed dysentery. Those who had most experience of this disease in India advocated posterior aspiration; then, if the pus was found, removal of a rib and free drainage. All dwelt on the importance of a very large drainage tube.

The work of the civil surgeon in South Africa.—Two days ago I received a letter from the Station Hospital, Ladysmith, dated 1st November 1900, portions of which letter, with your permission, I will read, just to indicate the sort of work which falls to the civil surgeon in South Africa. "I thought you would like to know more of the cases you were consulted about in the surgical ward here early in August. The Ayrshire footballer, with dislocation of the internal semilunar cartilage, I operated on, finding only a small portion of it turned over; I passed a chromic catgut through it and the capsule of the joint. The wound healed by first intention. The yeoman with acromegaly was discharged to Howick and invalided home. The orderly with varicose vein was operated on by tying the saphenous vein. He made an excellent recovery, and is regularly on duty. The young scout with locking of the elbow-joint, was sent to Mooi River Hospital to have an X-ray photograph taken. The night he got there a great storm occurred. All the tents were blown down, and all patients transferred to various hospitals down the line. The most interesting case I think was the Grenadier Guard, in whom you diagnosed division from bullet wound of the median nerve. The day before I intended to operate, I thoroughly overhauled the arm, trying to locate the ends of the divided nerve. In this I failed, but next morning he woke with returned sensation in the hand. I take it the nerve was not divided at all, but had become tied down, and strangled in fibrous tissue in the healing track of the bullet, and the manipulation had freed it. Under massage he made rapid progress, and was discharged to Howick, with a very useful and still improving hand. I had my best week in South Africa last month. An operation for abscess of the liver from gall stone; iridectomy for glaucoma; radical cure of hernia; laparotomy for an abscess of the spine after enteric, all doing well."

This letter is from Dr. J. B. Rudduck, civil surgeon. Possibly such a letter will best illustrate what seems to be an outstanding fact, namely, that the civil surgeons have been of much service in South Africa.

This paper is chiefly one of impressions. I wish I had been able to keep more notes, but the fact is that from the day I left Cape Town until I reached Cape Town again, with the exception of a few days at the Edinburgh hospital, I was constantly on the move and not placed in favourable circumstances for extensive

note-taking. May I, in conclusion, express the earnest hope that the medical history of this war will be fully described in the form, and with the thoroughness, that the great Civil War in America has been dealt with by the Government of the United States. From such a history, many most useful lessons will be learnt, which will be of the greatest use to all members of our profession, and specially to the Royal Army Medical Corps, and to those civil surgeons who may in the future be called on to serve Her Majesty in times of war.

ADDRESS DELIVERED TO THE EDINBURGH OBSTETRICAL SOCIETY, AT THE OPENING OF ITS SIXTY-SECOND SESSION, 14TH NOVEMBER 1900.

By R. MILNE MURRAY, M.B., F.R.C.P.Ed., *President*.

IN permitting me to open our Sixty-second Session, by addressing a few remarks to you from this chair, you give me an opportunity of expressing, in a formal but in a very cordial manner, my thanks for the great honour you have done me in electing me to the Presidentship of the Edinburgh Obstetrical Society. I assure you these are no empty words, for while I accepted with much diffidence the honour you did me in placing me in the position, already occupied by so many eminent men, none of my predecessors in this office appreciated the honour more than I have done. It is indeed no small honour to preside over a Society which has not only twelve years ago celebrated its jubilee, but which, during all these years of its existence, has filled the object of its institution so well, and has, year after year, contributed, in the most direct and concrete manner, to the establishment and progress of the science and art of obstetrics.

We are not likely to forget that most of the epoch-making contributions to our art, of masters like Sir James Simpson and Matthews Duncan, to name only two of those who have gone from us, have been first communicated to our Society; and I doubt if any other association, dealing with this department of medicine, can point to a record of work so sustained, and of such value, as this Society can show.

The origin of our Society dates from a meeting held in the New Town Dispensary, on December 4, 1839, at which preliminary matters were arranged, and the Society was actually constituted at the first formal meeting held on January 13, 1840.

The object of the Society was expressed in its first law, which read as follows: "The object of the Edinburgh Obstetrical Society shall be to advance Obstetric Medicine, by holding meetings for the

purpose of receiving communications and conversing on subjects connected with that branch of the profession."

It is not a little interesting to notice how very largely, in its early years, the Society was concerned with matters relating to obstetrics, and how small a proportion of its time was occupied by subjects relating to gynæcology, in the strict sense of the term. The first volume of the minutes, which contains the records of the Society for the first fifteen years, shows only an occasional reference to gynæcological subjects. An occasional specimen of a fibrous tumour (usually obtained post-mortem), a discussion on dysmenorrhœa, or a mode of treating a displacement of the uterus, represent the chief reference to this department. On the other hand, though during these years and for long after the Society did not publish its *Transactions*, one can see from the minute-book how keen was the interest of its members in scientific and practical midwifery. Communications relating to almost every department were made: such as the structure of the decidua, of the corpus luteum, the causation of convulsions, of puerperal fever, and the management of almost every complication, from a rigid perineum to a deformed pelvis.

If, on the other hand, we turn to the *Transactions* of the last fifteen years, we find a very different state of matters. The great advance which during this period has been made in the department of diseases of women, has impressed itself on our records in a very definite manner. So much is this the case that papers relating to the diseases of women have become more and more important and numerous, and there seems a danger that the impulse to explore new fields and to win new triumphs in the department of gynæcology may unduly divert our attention from the claims of obstetric medicine, and diminish our interest in the many unsolved problems it still presents to us. One sometimes has reason to fear that there is a growing impression in the mind of the student that the subject of obstetrics, as a field of scientific inquiry, is already closed, that its science and art are complete, and that it presents little inducement to the young and ardent inquirer, eager to grapple with the unknown and to win glory in scientific discovery or surgical achievement. On the contrary, a brief acquaintance with obstetrics, either as a practitioner or as a teacher, brings us in contact with problems whose solution would glorify the most ambitious enthusiast, and assure the transmission of his renown to many generations. It would be a grievous misfortune if such an idea as this should gain ground, or that the minds of inquirers should be diverted from investigations, the results of which would mean benefits incalculable to the human race.

It may appear to some of you that the present opportunity I have of addressing you, occurring as it does within a few weeks of the close of the century, might be best employed in reviewing in detail the progress of obstetrics and gynæcology during its course.

Such a review would be, no doubt, highly appropriate, but I feel that it is certain to be done more than once by others equipped with fuller knowledge and greater skill than I can claim. I would rather, if you will permit me, employ the time at my disposal in endeavouring to emphasise the importance of obstetrical knowledge to humanity, in its bearing, which has been recognised from all time, on the welfare of the individual and of the race, and in doing so to direct attention to some of the many problems which await solution in the century which we are about to enter upon.

Of the two great biological functions, nutrition and reproduction, the former first attracted the attention and interest of the scientific inquirer. The functions concerned in nutrition manifest simpler phenomena, which lie as it were before our eyes. They attract attention by their comparative simplicity and by their direct influence on the individual. Hence the naturalist was far advanced in his knowledge of the phenomena of nutrition before he turned seriously to those of the reproductive process. But we must also remember that it is not the mere difficulty of interpretation of the phenomena of reproduction which accounts for the ignorance of them which prevailed; in great measure we must look for an explanation of this ignorance in the effect of a great natural law. The light which Darwin threw on the workings of nature has given us a more correct perspective than we formerly possessed of the relationship of reproduction and nutrition. In the light of his work, and the theory of evolution which it does so much to establish and illuminate, we are enabled to re-write the old aphorism that "Self-preservation is the first law of nature" in newer terms, and to say that "Reproduction is the first law of nature, while self-preservation is the first law of the individual." We have but to look around to see this law manifesting itself on all hands, in the lowliest as in the most elevated of organisms. All life seems absorbed in a struggle between the race and the individual, a struggle to the death, and a struggle which involves pain and suffering and sacrifice on the one hand, a struggle which seems merciless and remorseless on the other.

Russel Wallace puts before us very clearly the vastness and intensity of this struggle, and I may quote his words:—

"The theory of natural selection rests on two main classes of facts which apply to all organised beings without exception, and which thus take rank as fundamental principles or laws. The first is, the power of rapid multiplication in geometrical progression; and the second, that the offspring always vary slightly from the parent, though generally very closely resembling them.

"From the first fact or law there follows, necessarily, a constant struggle for existence, because, while the offspring always exceed the parents in number, generally to an enormous extent, yet the total number of living organisms in the world does not

and cannot increase from year to year. Consequently every year, on the average, as many die as are born, plants as well as animals, and the majority die premature deaths. They kill each other in a thousand different ways; they starve each other by some consuming the food that others want; they are destroyed largely by the powers of nature—by cold and heat, by rain and storm, by flood and fire. There is thus a perpetual struggle among them, which shall live and which shall die, and the struggle is so tremendously severe, because so few can possibly remain alive—one in five, one in ten, often only one in a hundred, or even one in a thousand.”

Wherever we turn or in whatever aspect we view nature, we become aware of this continual reproduction, and the ceaseless struggle among the products, the unfailing death of the weakling, the persistence of the fitter, only, however, to take part in the reproductive process, perpetuating the race, and then to perish. The process is universal—it is potent among the *amœba*, and it is as potent among mankind. The simpler the environments, the simpler and more direct the conditions of the struggle; the higher in the scale of organisation and the more complex the conditions, the more subtle and varied the modes of attack. And over all Nature calmly sits—

“So careful of the type she seems,
So careless of the single life.”

Here, then, is the *raison d'être* of medicine—the science and art of self-preservation. The indifference of nature is compensated by the instinct of the individual. The desire to live, the dread of destruction, are primary elements of our constitution; the regulation of our nutritive processes, the rectification of their anomalies—the conservation, in fact, of the individual, of the weak against the strong, is the primary purpose of medicine.

So it has come about that, in the development of medicine, those processes which are concerned in the preservation of the individual at first attracted its interest, to the comparative exclusion of those concerned in the conservation of the species. But as we ascend the scale of development, the relations between the species and the individual become more intricate. Owing to the complexity of environment, the reproductive process becomes slower, more complicated, more hazardous. In the lower animals the process of reproduction *per se* is simple, and rarely involves immediate danger to the life of the parent. In man, on the other hand, the conditions are widely different. Owing to a variety of causes, the risks to the individual in the very process of reproduction are immensely increased; it is not merely a struggle among the offspring, the parent may be sacrificed as well. Thus, *cæteris paribus*, the more highly developed the species, the more liable it is to extinction. So arises the medicine of the reproductive process—the science and art of Obstetrics.

Like the science of other departments of medicine, that of obstetrics is of comparatively recent origin, and of course the true art of obstetrics, based as it must be on scientific knowledge, only then began to arise. But long before this an empirical art existed whose beginnings are lost in the remote past. The records of it are scanty and disconnected, but such as they are they are sufficient to show us that its importance was widely recognised, and its practice, in some form, universal.

In early times and in primitive peoples the practice of obstetrics would naturally be confined to women. In natural labours their duties would be simple and routine. At first friends and neighbours would perform the kindly office, but soon a separate class would spring up whose special aptitude or experience would inspire the parturient women with greater confidence.

But though the birth of a child was of daily occurrence in the primitive community, the processes of pregnancy and labour were shrouded in inscrutable mystery. The pregnant woman only too well knew that in sorrow and labour would she bring forth her child, and that, ere she had looked on its face, she herself might have passed out into the unknown; and, on the other hand, the barren wife heard the prattle of children's tongues, and wondered why she should be cursed and desolate. It is to the mystery and danger with which the reproductive process is associated that we must look for the explanation of the close relation between ideas connected with reproduction and every primitive religion.

It is not easy for us, with the myriad details which modern science and research bring before us, and which claim a share in our consideration, to realise how comparatively few are the phenomena which appeal to the primitive mind. Beyond those which affected his individual organism, such as hunger and thirst, heat, cold, wind and rain, the most prominent objective phenomenon was undoubtedly the continuous process of decay and dissolution on the one hand, and the no less continuous process of revival on the other, which were everywhere present around him.

Year by year, as the sun sank in the autumn sky, he saw that the waning light and shortening day were accompanied by the drooping and decay of all nature. The ripened fruit fell, the leaves withered, the grass browned and shrivelled, and the earth passed, as it were, into a deep sleep. But when the spring returned and the sun mounted the heavens, nature awoke, the lengthening day and the increasing warmth stirred the sleeping earth, and from its bosom burst forth twig and leaf and flower. It is easy to understand how close to those engaged in husbandry seemed the relation of the sun to those alternate processes of decadence and revival, and to them the Sun-god, as the revivifying and regenerating influence, became the first and most august

object of adoration, for to the tillers of the soil the sun was the primal force in nature. But the worship of the generative principle was not confined to the husbandman. The same process of decay and death was present, not only in the vegetable, but in the animal world as well. The shepherd saw that among his flocks and herds, among the members of his family, the same process was at work. Man and beast grew old and died, but the tribe and the herd were maintained and augmented, for a steady and restless reproduction kept step with, and at times almost outstripped, the inevitable decadence and dissolution. And then it was borne in on him that the power and influence of his race, no less than the abundance of his wealth, were dependent on this principle, the ceaseless revivifying influence of nature.

In various ways and in different localities this idea found local and special expression. Such expression was found in the worship of the Sun, Tree, Serpent, and Phallus, one or other of which constitutes an essential element of every primitive religion. For these consist fundamentally in the invocation or propitiation of the generative or procreative principle. Hence arose temples and shrines to tutelary deities, where their help could be secured by prayers or their anger averted by sacrificial offerings. To these temples came the suppliant for advice or assistance. Not only the herdsman to propitiate the god and to secure the increase of his flock, and the husbandman to present his first-fruits and to pray for the due reward of his toil, but also the pregnant woman that she might safely pass through the perils of childbed, and the barren woman that she too might be blessed and see her children around her.

About fifteen miles from Rome, the Appian Way passes close to the Lake of Nemi. By it in ancient times stood the far-famed Arician Grove, sacred to Diana. The priest of this grove was an escaped slave, who had secured his position by the slaughter of his predecessor. To the altar, served by this priest-king, as he was called, flocked suppliants from many parts. Chief among these were barren women desirous of children, and pregnant women seeking an easy delivery. It is worthy of note that these came not to a shrine of Juno, Venus, or even of Demeter, but to that of the chaste Diana, the one virgin goddess of the classic mythology.

On a clear spring day last year I stood on the great platform in front of the church of San Pietro in Monitorio. Looking across the domes and palaces of the Eternal City, I could see on the slope of the Alban Hills the spot where stands the village of Nemi, near by the site of the famous grove, and my thoughts went back to the troops of women who, more than twenty centuries before, had sought the help of the virgin deity at her shrine. A little later I turned in to the church, and as I passed the altar of Our Lady, a poor woman, far advanced in pregnancy, rose

from her knees before it. It required no great insight to divine the subject of her prayers, and I could not but ponder on this pathetic link with the past, for of old the pagan craved the succour of the virgin goddess in her grove, and to-day the Christian breathes her prayer at the altar of the Virgin-Mother of her Lord.

It is not then difficult to understand how close must have been the relation between primitive religion and the primitive medicine of the reproductive process. The inscrutable mystery which enfolded, and the constant peril and suffering which attended upon, pregnancy and parturition, must have inevitably driven the pregnant woman to seek the favour of the tutelary god, and the priest became at once her intermediary and her adviser. If a prayer or an incantation was all he could offer, it must still have proved a solace to many a suppliant, ignorant of natural laws and causes, and about to enter on her great trial. If the labour proved normal, and its necessities were met by the skill of her neighbours, the help of the god would be acknowledged by the votive gift; if disaster attended her, there was no help for it, she must bow before the anger of an unappeased deity. The death of the mother or child at birth was regarded, not as the result of a diseased or abnormal state of the body, but as the curse of a god whose favour must be secured ere the danger could be averted. The priest who prescribed the mode of atonement played the part of the physician, so far as the disorders of pregnancy and labour were concerned; and thus in a sense our art took its origin, if I may use the term, "within the pale of the Church."

No doubt in course of time the office of the physician became detached from the purely priestly function, and in Egypt, as early as 3500 B.C., we know that a class of priest-physicians existed whose duties were mainly concerned with the bodily ailments of their suppliants, and especially with those of pregnant women.

But there comes a time when the thick canopy of ignorance and superstition is pierced by fitful gleams of truth and knowledge. Processes which were at first hidden and mysterious become revealed in part, and it becomes gradually borne in on the awakening intelligence that what appeared to be the freak of a god is the expression of part of the complex order of the universe. Recurring phenomena are observed and correlated, and expectation and action are regulated thereby.

And so it comes about that, even in the subdued light yielded by the first glimmerings of scientific observation, the mysterious processes of pregnancy and parturition were found in the main to follow a certain well-defined course, and where deviation arose an explanation and a remedy were sought and sometimes found. In this way was laid the foundation of our art, crude and empirical it was at first, and for many centuries it remained so, but its

foundation was laid when men shook themselves free from the burden of superstition, and observed and pondered for themselves.

The earliest compend of our art is to be found in the Hippocratic writings. This may be supposed to have focussed the practice of midwifery at the time of Hippocrates (400 B.C.). But centuries before that period some form of obstetric art had been practised in Egypt and in Greece.

In 715 B.C., Numa Pompilius had promulgated his *lex regia*, which ordained that if a woman died in pregnancy the child was to be cut out of her uterus. The teaching of Hippocrates, crude and fallacious as much of it was, represented most of the obstetric art of nearly 2000 years.

About the beginning of the Christian era, the study of anatomy under the Ptolemies at Alexandria gave a new impulse to medicine. Many of the Hippocratic errors were rectified, and a distinct advance was made in the obstetric art. To the knowledge of anatomy gained here is due the progress in obstetrics shown by the Greek physicians practising in Rome in the early years of this era.

The influence of this knowledge, as seen in the works of Soranus, Galen, Aretæus, and Moschion, has been ably set forth in the learned paper which Dr. Barbour communicated to this Society.¹

But from the seventh century until the beginning of the sixteenth, obstetric art stood still. Indeed, after the fall of the Roman Empire, it fell, like other arts, on evil days. All trace of the earlier teaching was lost, with the knowledge of the anatomical principles on which it rested, and its practice, passing into the hands of the lowest women, was regulated by superstition and gross ignorance.

But after 800 years dawn began to break. In the early years of the sixteenth century the school of Salerno inaugurated the teaching of anatomy, and the light shed thereby had its influence on the dark and degraded practice of obstetrics. Progress was at first slow, and its practice remained for long in the hands of women. But by anatomists like Vesalius, Berengarius, Fallopius, and surgeons like Paré, a scientific basis was laid and the knowledge of Soranus and Moschion rediscovered. Further, while ordinary labour was still attended by women, the surgeon was more and more frequently called to difficult cases.

If the sixteenth century is mainly characterised by research in anatomy which created the scientific basis of obstetric art, the seventeenth century claims our interest, in virtue of the great development in practical midwifery rendered possible by the

¹ "On Early Contributions of Anatomy to Obstetrics," *Trans. Edin. Obst. Soc.*, vol. xiv.

invention of the forceps, though their use was not general till the early years of the next century. In 1668, Mauriceau published his treatise which formed the text-book of the French school for many years, and towards its close Deventer was preparing for publication his book, which in some respects may be considered the foundation of modern midwifery.

The eighteenth century was a period of rapid development, and in it we meet with a galaxy of names, whose contributions to the science and art of midwifery it would be difficult to over-estimate. In England, Smellie, Hunter, and Denman; in France, Levret and Baudelocque; in Germany, Roederer, contributed in no small measure to the elimination of empiricism, and the establishment of the science and art of obstetrics.

What, then, was the state of the science and art of midwifery when the dawn of the nineteenth century broke?

The researches of anatomists during the three preceding centuries had secured an acquaintance with the reproductive organs, which, though defective and faulty in many details, yet served as a sound working knowledge for the obstetrician.

The observations of obstetricians themselves, such as Mauriceau, Levret, Smellie, and Hunter, among others, had secured a certain accurate familiarity with the phenomena of pregnancy and natural labour. Something more than a glimmering of the nature of the mechanism of parturition had been acquired by the work of Ould, and especially of Smellie and Levret. More or less definite ideas had been attained on the management of abnormal labours, such as breech and transverse cases. The indications for and the mode of use of, the forceps had been so far determined, and some methods of embryotomy had been evolved and practised. The Cæsarean operation had been performed, in some cases with success, but in the main with results so disastrous as to render its justifiability, save in the case of a dead mother, very dubious. While the management of placenta prævia was in a very unsatisfactory condition, both as to methods and results, that of accidental hæmorrhage had been laid down on sound lines by Smellie.

The practice of midwifery, indeed, in this country was largely under the influence of the teaching of Smellie, and in France under that of Levret, and while it still contained much which was empirical, much was established on sound and scientific principles.

I have already said that I have no intention of reviewing the progress of our art during the closing century, but in order that we may duly appreciate the responsibilities under which we enter the coming one, it is necessary that I should refer to three epoch-making contributions to our science and art, for which the nineteenth century will ever be famous.

In 1818, Nægele of Heidelberg published his pamphlet on the "Mechanism of Labour." As the result of this unpretentious-

looking brochure, one of the greatest, if not the greatest, contributions was made to scientific obstetrics. "No other work of equally small size," says Dr. Tyler Smith, "ever exerted greater influence upon any branch of medicine than that of Naegele upon midwifery. It may be termed, indeed, the Euclid of Obstetrics." Making all allowance for certain errors, one may truly say that Naegele's work enabled the observer of a labour to become at once a scientific obstetrician, and thus to raise himself above the level of the ordinary midwife.

By its means he was able to diagnose the normal and abnormal, to predict and intervene with intelligence and precision. I am almost afraid that we who have been nurtured on the mechanism of labour from our youth up, too often forget what we owe to Naegele. I for one have often marvelled, when watching the evolution of the foetal head in its course through the pelvis, that one man could have observed and noted with so much scientific acumen, not only the normal process, but its variants, and in this way have correlated and focussed the mass of incoherent observations which obstetricians had been collecting and puzzling over for nearly eighty years.

Thirty years later, another epoch was reached, when, in 1848, Simpson discovered that anæsthesia, whether produced by ether or by chloroform, may be used to soothe suffering, without interfering with the efficient progress of labour, and that, moreover, the "divine balm," while robbing labour of half its terrors, enables the obstetrician to exhaust the resources of his skill and experience on behalf of suffering motherhood. It is one of the chief glories of our Society, not only that its records contain the first account of the use of anæsthesia in labour, but that he to whose genius we owe the true appreciation of what anæsthesia meant to mankind, and whose invincible energy, in the face of cant, prejudice, and stupidity, forced the whole world to accept the divine gift, was for many years the foremost Fellow, and most unwearied worker in our Society.

Another period, this time of twenty-three years, elapsed when Lister gave to the world the principles of antiseptic surgery. This achievement was no doubt rendered possible by the labours of Pasteur and others, which had preceded it, but the glory is none the less Lister's, for the revolution which it has wrought in modern medicine is the direct outcome of his incessant labours and teaching.

It was not long ere the obstetrician realised what antiseptic methods meant for his art, and the results which have been attained by them in practical midwifery constitute by no means the smallest tribute to Lister's genius.

I have confined myself, as I have said, to the accentuation of these three great contributions to scientific and practical obstetrics. I have not attempted to note or specify the host of workers who

have during the last hundred years been laboriously adding to our records of scientific discovery and practical achievement, who have each in his own way contributed to the making of obstetrics as it is. Rather would I, in the time that remains to me, direct your attention to what has yet to be done for our science and art, and which awaits our endeavour in the century whose threshold we are about to cross.

And, first, lest the scientifically minded among us may feel, as they sometimes seem to do, that there is no work awaiting them, let me just name some of the problems we have yet to solve, in the hope that one of them at least may seem worthy of their efforts.

Among these problems I would name the true significance of menstruation, and its relation to ovulation and conception; the function and destiny of the corpus luteum; and that perennial subject, the structure of the placenta; the true duration of pregnancy; the cause of labour, and the nervous mechanism of the uterus; the nature of the process concerned in the involution of the uterus; the cause of that obstetrical terror, eclampsia; and many other riddles, of greater or lesser interest, all awaiting solution, and worthy of the best efforts of the best minds among us.

That many of these will be made clear in the coming century, I have no reasonable doubt. I would even hope that some of those whom I now address may hold the cord which will lift the veil which hides their meaning from our eyes.

But, gentlemen, we as obstetricians enter upon the new century with a far heavier responsibility on us than is represented by our duty in scientific research, however immediately attractive or remotely important its application may be, and it is to this grave responsibility which, in conclusion, I would venture to draw your attention.

First, let me ask you to take stock of the equipment which, as practical obstetricians, we profess to possess. We stand to-day "the heirs of all the ages," and, in virtue of the labours of those who have gone before us, we claim that, for every strictly obstetrical complication which can arise, with only perhaps one exception, we have at our disposal a procedure with which we can meet it—that, in fact, there is scarcely a peril which can beset a woman in travail, out of which we have not the means of rescuing her. Of course I speak of strictly obstetrical complications. There are accidental conditions, such as grave disorders of the nutritive apparatus, of the heart, lungs, kidney, etc., which produce conditions with which obstetric medicine is at present powerless to deal.

But for all else (save perhaps eclampsia) we profess to have a remedy, provided always we are entrusted with the care of the patient in reasonable time. Malpresentation, malposition, deformed pelvis of whatever degree, hæmorrhage of whatever sort,

rupture of the uterus,—each and all have their appropriate treatment, which has been tested times and times again, and has stood the test with unqualified success. This, then, is the profession, and the reasonable profession, made by the obstetrician to-day, armed as he should be with an accurate knowledge of obstetrics, and with anæsthetics and the technique of antiseptic surgery.

Surely, then, the trees of the Arician grove are dead and withered, for no woman now need come to the shrine of the goddess; and surely also the litany for all women “labouring of child” is obsolete and forgotten. Alas, it is not so, for the trees of the grove are green as ever, and the altar of the goddess is loaded with offerings, and the litany goes up each day from trembling lips and sinking hearts; for every year, in our land alone, nearly 5000 women fall and perish in the perils of childbed.

Where now is our proud boast? What are we to say for modern midwifery, when we witness year by year this sacrifice of fifty hecatombs of the most precious lives in the whole community, most of them in the very prime of life, many of them already the mothers of helpless children. Are we to fall back on a counsel of despair, and declare this to be the irreducible minimum? Surely, by all that is reasonable, No!

Let us look at the facts a little more closely. Between the years 1847 and 1856 the average annual death-rate from puerperal fever was 1·89 per 1000. During these years chloroform was coming into use, but was by no means generally employed, and antiseptics had scarcely been thought of.

Between the years 1875 and 1884 the mortality from the same cause rose to 2·28 per 1000 births. By this time anæsthetics were in wide use, and antiseptic methods had been taught and practised to a very great extent.

Between the years 1886 and 1895 the mortality had now risen to 2·46 per 1000. During this time anæsthetics and antiseptics may be supposed to have been almost universally practised.

TABLE I.—*Mortality from Puerperal Fever in England and Wales.*

			Mean Deaths per 1000.
1847-1856	{	Early anæsthesia— No antiseptics }	1·8
1875-1884	{	Anæsthesia general— Early antiseptics }	2·28
1886-1895	{	Anæsthesia general— Antiseptics general }	2·46

These figures are sufficiently startling. They have been already discussed by Boxall, Cullingworth, Williams, and others; and that deaths from puerperal fever are increasing during the last forty or fifty years, is undoubtedly as true as it is appalling.

Attempts have been made to account for the great proportion of septic deaths in labour by the errors of practice of ignorant and ill-trained midwives. I cannot see how this is borne out by the facts. Are midwives proportionately more numerous and more densely ignorant now than they were fifty years ago? I cannot speak from personal knowledge of English practice, but I am quite sure that in Scotland far more labours are attended by medical men in proportion to midwives than was the case at the middle of the century. Let us see, then, how matters stand in Scotland.

TABLE II.—*Childbed Mortality in Scotland.*

	Accidents of Childbed.	Puerperal Fever.	Total.
1897	331	205	536
1898	351	227	578

Now, had the increase in 1898 been proportional to the increase of population, the figures would have been, 1897 = 536; 1898 = 540, an increase of four. Instead of that we have an increase of forty-two, more than ten times the normal. There is nothing to be gained by trying to explain these figures away, and the midwife, much as she has been compelled to play the part of the scapegoat, cannot carry this burden into the wilderness.

Are we then to conclude that, so far as obstetrics is concerned, the discoveries of Simpson and of Lister are in vain; nay rather, that it would have been better had neither of them lived?

Let us look at another page of our record. We all know the frightful mortality which, during the earlier part of this century, seemed bound up with maternity hospital practice. I do not stop to recall the figures, but I ask you to look at the statistics of one of our great hospitals, the Rotunda, for the two years—1896-97 and 1897-98.

TABLE III.—*Rotunda Hospital.*

	Total Cases.	Mortality.	Per 100.
1896-97	1448	2	0·13
1897-98	1513	6	0·39

A brighter picture this. Here surely we are as near as may be the "irreducible minimum," and Simpson and Lister are both justified and glorified.

Why then are the results of private practice so far behind those obtained in hospitals such as the Rotunda. Some may assert, because the circumstances are different, and conditions can be secured in one which are impossible in the other. That may be quite true. But then, on the other hand, why are the results of private practice becoming worse and worse, in spite of all that has been done for our science and art during the closing century? How can this terrible mortality, connected with what ought to be a physiological process, go on increasing year by year, in spite of improved sanitation and other civilised amenities, in spite of the advantage given us by accurate scientific knowledge, improvements in instrumental appliances, and increased practical skill? The explanation may be complex, but there must be some cause or causes at work to account for it, and this is the problem we have to face in the coming century. The process of parturition is becoming more and more hazardous, and obstetric art lies under a stigma, and does so deservedly, until the reason of it is discovered, and this terrible sacrifice of human life is checked.

This is not the time to attempt an exhaustive analysis of the various causes which may be at work in producing the state which we now deplore, but I cannot conclude these remarks without asking your attention to one set of causes which I am convinced may account for a large part of this needless mortality. I feel sure that an explanation of much of the increase of maternal mortality, from 1847 onwards, will be found in—first, *the misuse of anæsthesia*; and second, *in the ridiculous parody which, in many practitioners' hands, stands for the use of antiseptics*. In a word, the use which has been made by many of two of the greatest blessings of humanity has converted them into little else than a curse. Before the days of anæsthesia, interference was limited, and obstetric operations were at a minimum, because interference of all kinds increased the conscious suffering of the patient. Thus forceps and turning were employed when natural efforts had failed, and such operations as the artificial dilatation of a rigid os were not attempted until it became an urgent necessity. When anæsthesia became possible, and interference became more frequent, because it involved no additional suffering, operations were undertaken when really unnecessary, on the demand of the patient, or for the convenience of the practitioner. And so complications arose, and the dangers of labour increased. But the knowledge that this interference involved risks must have served as a salutary check to some extent. I doubt not that a split cervix, followed by a fatal hæmorrhage or a death from puerperal fever, must have burned its lessons into more than one reflective conscience in those days. Then came the antiseptic era. Here was now the panacea

for all the dangers of childbed. All that was necessary was to dip the instruments for a few minutes in a carbolic lotion, and the hands in one of half the strength for half the time, and all danger was at an end. The forceps were passed through an undilated os; if it tore slightly, no matter—the antiseptic made that quite safe. Turning was now a matter of mere manipulative skill—a clean hand in the uterus could do no harm. This is no mere caricature; and if it represents the methods of any reasonable proportion of practitioners, what wonder the cup is so often filled with death. When we hear of men who admit that forceps cases represent 30 to 70 per cent. of their practice, we wonder what the antiseptic precautions are which they claim as their justification. Normal labour is a natural process, which is best left to itself, and the less the patient is disturbed with the paraphernalia of obstetrics before or after, the better.

But the moment we interfere, it becomes a complex and dangerous process, and it is simply because this is constantly being ignored that the death-rate of childbed is what it is to-day. Until men realise this, and recognise the fact that the simplest obstetric operation demands not one whit less of care as to antiseptic precautions than is required of one before opening the abdomen, we shall get no further forward. A bruised or lacerated maternal canal is quite as susceptible to microbic attacks as the peritoneum, and probably more so. When the practical obstetrician realises his responsibility, and that no small share of this terrible maternal mortality of a certainty lies at his door, he has made the first step towards true progress. When he realises that labour is a natural process, which in the great majority of cases it is criminal to disturb; when he realises that every interference increases the inherent danger a hundredfold; and when, under this consciousness, he brings with him, to the lying-in room, all that is possible of those principles of antiseptic surgery which have been at the bottom of the triumphs of modern gynæcology, we shall not have long to wait for the lightening of the dark cloud which hangs over us now.

I have trespassed too long on your time, but I felt that the subject which has occupied me was one which pressed more for attention and consideration than any other I could think of, and I felt that, however unworthy of the momentous question these remarks may be, no more appropriate audience or occasion could be found. During these last days of the dying century, there will be many tributes to the great men and their achievements, who, during it, have added to the intellectual and material "joy of life." But I felt that among the strains of joy with which we part from the old and enter on the new, one minor chord, however feeble, might not be amiss—"Lest we forget."

When Pandora opened her fateful box, one legend says that all the Winged Blessings flew away, and only Hope was left. And

though it would almost seem as if all the Winged Blessings of our art had vanished beyond the cloud that overhangs it, as we pass from the old century to the new, yet Hope comes with us, and even as we look at the shadow it seems to lighten, and the Winged Blessings are seen hovering not far away, for we take with us this assurance, from the old century to the new, that the former has shown us the means by which, if faithfully used, we may dissipate the clouds and render our art worthy of its high and beneficent purpose.

ON THE OPERATIVE PROCEDURES FOR SIMPLE FRACTURES WHICH HAVE BEEN UNSCIENTIFICALLY TREATED.

By W. ARBUTHNOT LANE, M.S., *Surgeon to Guy's Hospital and to the Hospital for Sick Children, London.*

(PLATES I.-V.)

WHEN I commenced to operate on cases of simple fractures in 1893, the radiograph was unknown, and I did so in the belief that, owing to a shortening of the ties in the length of the limb by hæmorrhage and subsequent inflammation in fractures of the long bones, and especially in those of the leg, it is impossible by manipulation, except under special and rare conditions, when the factors resisting replacement were in abeyance, to restore to their normal relationship fragments which have been displaced off one another, whether the direction of the fracture is transverse or otherwise. My views on this subject are described in detail elsewhere,¹ and are summed up briefly in a recent lecture.²

The radiograph, which came into use in 1896, verified in every detail, in the most complete manner possible, the conclusions I had arrived at, and no one has, to my knowledge, brought forward any evidence to rebut them. Many vague general statements of an antagonistic character have been made, but any trustworthy facts, as, for example, radiographs of cases treated successfully by manipulation and splints, have not been forthcoming. I have not the slightest doubt that if it were possible to produce the results that surgeons taught ought to be obtained, and which they stated they were in the habit of obtaining, they would have been brought forward long ago.

Now that the principles upon which are based such operative treatment of simple fractures as is necessary to restore accurately

¹ "Operative Treatment of Simple Fractures, Cleft Palate, etc."

² "On the Operative Treatment of Simple Fractures," *Lancet*, London, May 26, 1900.

to their normal position the fragments of long bones, and especially those of the leg, which have been displaced by violence, and which cannot be restored by manipulation, are more or less generally accepted, and the surgical measures which I advised are widely adopted, I think it may be of interest if I describe the condition of some cases of unsatisfactory union, resulting from the imperfect and unscientific treatment previously employed, in which I was asked to operate in order to restore the patient from a crippled state to one of active usefulness.

I wish to call attention to two classes of cases. The first is the condition of mechanical disability which so often results from imperfect restoration of the broken bone to its normal form. The patient may require to be treated either for a more or less complete inability to perform his functions normally, or for pain, or for both conditions. The degree in which the above are present varies considerably with the displacement of the fragments and with the age and habits of the patient. They are generally very marked when they oblige the sufferer to submit to a serious operation which is surrounded with many risks and difficulties. The next class is that of non-union between the displaced fragments, a so-called false joint being developed at the seat of fracture.

The first group is very rarely alluded to, and surgeons will always insist and affect to believe that such cases do not exist in their practice.

A very large number of these cases have come under my care, and have derived a varying amount of benefit from operative procedures, undertaken with the object of restoring the deformed bones as completely as possible to their original form. In the case of the upper extremity, the patient usually suffered from such a limitation of the movements of the bones on one another as altogether incapacitated him from following his employment. Occasionally the radius and ulna had united to one another. Sometimes also, in the case of female patients, the very obvious deformity of the part, rather than the disability, induced them to undergo an operation. In the lower extremity, pain, associated with a corresponding amount of mechanical disability, forces the sufferer to submit to any operation, however serious.

The number of cases operated on form a very small proportion of those which have applied to me for relief, and for many obvious reasons. For instance, to most of them I could promise but a slight prospect of improvement in their condition as the result of operative interference, because the displacement was of long standing, and such definite mechanical changes had taken place in the joints influenced by the deformity, as rendered it unlikely that the patient would lose pain and disability when the fragments had been restored as nearly as possible to their normal relationship to one another. The operative measures necessary

to dissociate fragments which have become firmly ankylosed together, and perhaps to adjacent bones as well, and to saw off sufficient bone from each fragment in such planes as will restore the outline of the necessarily shortened bone, is often very difficult, and may be fraught with damage to important adjacent vessels and nerves. Such operations must not be undertaken lightly, and unless the patient is likely to derive a freedom from pain and disability sufficient to compensate for the risk run. Sometimes it is absolutely impossible to restore the axes of fragments, however extensive the operation and however skilful the operator. It not uncommonly happens that in old-standing fracture of the ulna the head of the radius has been displaced from its normal relationship with the humerus for too long a period to allow of its being replaced in its original position and restored to its previous functional activity. I need not allude to the very frequent separation of the epiphyses, as, for instance, those of the head of the femur, or of the lower end of the humerus, in which, if even only very few weeks have elapsed since the injury, all hope of restoring the fragment to its normal position must be given up, and the surgeon is driven to make some more or less unsatisfactory compromise. The frequent occurrence of these cases must be well known to surgeons of any experience, though I can readily understand any individual observer deluding himself with the idea that he has managed to avoid them in his practice.

When I consider the unfortunate physical condition of the patients whom I have had under my care, and the misery, distress, and financial loss they and those dependent on them have experienced through the gross inefficiency of the so-called science of which they are the victims, it seems little short of ridiculous to read the statements of surgeons. that such mechanical disability is a rare sequence of fracture, and that it can usually be obviated by the use of massage and passive movements at an early date. That massage and passive movements serve to diminish the disability and pain which would otherwise ensue if these fractures are left for an indefinite period in rigid casings, is quite familiar to me, but to suggest such measures alone as being scientific treatment, and not merely adjuvant, suggests a want of perception of the mechanics of the skeleton.

The second group of cases, namely, those of ununited or imperfectly united fractures, are due also to the same unscientific treatment of fractures. Looking through the text-books, I find any number of reasons given for non-union of broken bones, the vast majority of which appear to be utterly without foundation in my experience. The surgeon is only too anxious to lay what blame he can upon his patient or his tissues, and seems inclined to regard as possible any factor other than the inefficiency of his treatment. It may be that in some few cases of simple

fracture, non-union results from some cause which could not be obviated by proper treatment, but I have never come across one instance in which union would not have resulted if efficient operative measures had been adopted, though a very large number have come under my observation. I would also like to express an opinion on the frequency of ununited fractures, since my observations on the subject differ completely from that of those who have written about them. My experience and their statements are not to be reconciled, since I believe that *ununited fracture is of comparatively common occurrence*. I am not surprised at this divergence, as I frequently hear surgeons make assertions as to the results of their treatment of fractures which they believe to be accurate, and which I have reason to regard with suspicion. As to the published statistics of the frequency of non-union, Lonsdale¹ found that out of 4000 fractures treated at the Middlesex Hospital, only four or five refused to unite; Norris² did not meet with one case out of 946 fractures; Liston met with only one in his practice. Hamilton says they do not exceed one in 500 cases, and thinks that this is a high estimate. I do not like to think that surgeons of the present day are less successful than their predecessors in obtaining union, as precisely the same rude methods were employed by both. The probability is that earlier observers were less careful in the examination of the results obtained, and this habit of regarding them through rose-coloured glasses still clings to the profession, particularly as regards the consequences of fractures.

If there was any truth in these published statistics, it would certainly be difficult to account for the number of cases which I alone have treated. I find that other surgeons also seem to operate on a fair number of them. On these grounds I have no hesitation in assuming that the accepted statistics on this subject are, as usual, utterly false and misleading.

As I have no confidence in statements of others when unsupported by facts, I will proceed to give a brief account of a few cases from each group which have come under my care, commencing with those comprised under Group I., between which and Group II. there can be no sharp definition, as they merge into one another.

CASE 1.—Plate I. represents the result of an operation performed in January 1899 upon a patient, æt. 34, who was the matron of a hospital. She eight months before sustained a Pott's fracture. At the time of the injury she was placed under the care of surgeons of very high repute. Still the displacement of the fibular fragments remained, and, in spite of massage and the means usually adopted in these cases, she was unable to do more than hobble about. Even this caused her great

¹ "Practical Treatise on Fractures," London, 1838.

² "On the Occurrence of Non-union after Fracture," *Am. Journ. Med. Sc.*, Phila., Jan. 1842.



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pain. If she continued as she was she must have given up her only means of livelihood, and settled down to the life of a cripple. As will be readily recognised by the number of screws and wires, shown very clearly in the radiograph, which I found it necessary to introduce, the difficulty experienced in levering out the lower fragment after the lapse of many months was great, but, by carefully gauging the displacement, I was enabled, by means of two sections crossing the seat of fracture obliquely, to restore the fibula almost completely to its normal form, and the foot to its original mechanical relationship with the leg. The result has proved most satisfactory. The patient is now able to walk for miles without pain, and has resumed her usual occupation. This shows clearly *how entirely the incapacity of the patient, in a Pott's fracture, results simply and solely from the alteration in the mechanical relationship of the bony framework of the ankle-joint, consequent on the displacement of the fragments of the fibula.*

CASE 2.—Plate II. represents the result of an operation which was performed to restore to the patient the use of her limb. Before she sustained the fracture she occupied an active and important post in the nursing world. She fell down a gangway and broke her tibia and fibula across at the same level, and the fibula a second time near its upper extremity. She received every possible care and attention at the time, being treated in the usual manner. Months and months passed, and she found herself unable to bear her weight upon the limb. She spent a month in a London hospital, but she derived no benefit from the treatment employed. She then came under my care. The radiograph showed very considerable overlapping of the tibial fragments. The material uniting them was dense and strong, but, owing to the alteration in the axes of the fragments, she was only able to transmit at a mechanical disadvantage her weight, which was considerable, and which had increased during the long period in which she was unable to move about. As the fibular fractures were at a considerable distance from the ankle-joint, there seemed but little, if anything, to be gained by attacking them. I therefore exposed the tibial junction, and, gauging the displacement as accurately as possible, sawed off the ends of the bones obliquely, so as to bring the axes of the upper and lower fragments into the same line. The double fracture of the fibula had rendered it unnecessary, as is usually the case, to divide this bone also, to effect with complete accuracy the apposition of the tibial fragments.

Firm union took place, and the patient resumed her usual occupation, suffering only a moderate amount of discomfort from the shortening, and from the slight displacement of the fibular fragments.

CASE 3.—Plate III. represents the femur of A. B., a governess, æt. 41, on whom I operated on 20th April 1898. She sustained a fracture of this bone in June 1897, more than a year before she came under my observation. Though she had been under skilful treatment during the whole of this time, she was, when I saw her, quite unable to walk, because of great insecurity, and of the pain she experienced in her hip- and knee-joints, as well as in the seat of the fracture. The upper fragment ran outwards, forwards, and downwards, while the upper

extremity of the lower fragment was united to its inner aspect. This is the most common arrangement of the fragments when the femur is broken in this situation. Besides, the deformity and the shortening of the limb were very considerable. The seat of fracture and the relative position of the fragments having been carefully defined by means of the radiograph, it was freely exposed by means of a long vertical incision on the outer side of the thigh. The callus which connected the fragments was divided with the chisel, and the extremities of the fragments were sawn through in planes which permitted of their approximation. The fragments were approximated by means of lion forceps, very great traction being exerted at the same time upon them. They were fixed immovably in accurate apposition by means of screws. Her recovery was rapid and uneventful. The result was most satisfactory, the deformity being reduced to a minimum; indeed, it was no longer appreciable, while the shortening was considerably lessened, and the patient was able to walk with security and without anything more than discomfort in the joints, which was increased by much exercise. This was due to the fact that it was impossible to establish the fragments in the normal axial rotation.

CASE 4.—Plate IV. represents the result of an operation for a fracture of the tibia and fibula, the result of direct violence. In January 1893, the patient, S. B., æt. 27, was treated in a large London hospital for simple fracture of the tibia and fibula. He had every advantage that science and skill could offer; indeed the surgeon under whose care he was placed is an acknowledged authority on fractures and their treatment. Manipulation and a plaster-case were the treatment adopted. He came into my hands many months after the injury, with the fragments overlapping considerably, the union between them being such as not to enable him to bear his weight upon the limb because of pain in the fracture and in the ankle-joint. The foot was forced inwards in such a manner that the ball of the great toe, centre of the patella, and the anterior-superior spine, occupied the same straight line. This adhesion to an antiquated teaching had, combined with a want of recognition of the factors that resist the replacement of the fragments, brought about a result that was completely disastrous to the patient.

In October 1893, both the seats of the fracture of the tibia and fibula were freely exposed, and the displacement of the fragments and the alteration in their axes were carefully gauged. Then the bones were sawn through in four separate planes, so as to permit of the fragments being brought together in such a manner that their axes retained a normal relationship to one another. The tibial surfaces were then held immovably and accurately together by means of three screws, and a loop of silver wire connected those of the fibula. The progress made by the patient and the result of the operation were excellent. The only mechanical disability which he experienced was the shortening of the limb, which was unavoidable because of the prolonged overlapping of the fragments, since the axes of the component parts of the shortened tibia and fibula were rendered normal.

As the result of the imperfect apposition of the broken surfaces in the first instance, the man and those dependent on him were deprived



of the benefit of his services for nearly a year longer than was necessary, and at the end of that time he was incapacitated to the extent of the shortening of the leg, and will probably suffer later in life from changes in the joints, whose mechanics must be altered by the fact that the restoration of the shaft of the tibia to its original form was not perfect. I would point out that the patient, when he sustained the fracture, was a young and vigorous man in excellent health, and one in whom repair proceeded actively.

The next case I will call your attention to is also a young man.

CASE 5.—M. S., æt. 23, was admitted under my care in March 1899. While serving as a gunner in India, he sustained a Pott's fracture. As far as I could gather from him, he received every possible care, being treated by means of splints, and later by massage and manipulation. He was encouraged to use his leg as much and as early as possible.

In spite of all treatment, he was unable to bear his weight on that foot, and was obliged to support his weight on a crutch. As he made no progress, he was invalided from the service in January 1899, without any means of obtaining a livelihood.

I operated on him in March 2, 1899, and found that the fibula had been fractured about $1\frac{1}{2}$ in. above the tibio-fibular articulation, and that the inner malleolus had been broken transversely at the level of the tibial facet, and had been displaced outwards and backwards upon the under surface of the tibia, to whose articular surface it had to some extent become united by bone. In consequence of these fractures and the displacement of the fragments, the astragalus had been forced outwards, and rotated around a vertical axis. The displaced inner malleolus was cut away from its abnormal connection with the tibia, leaving, however, a portion of the facet on the under surface of the tibia bare and uncovered by articular cartilage. The fibula was sawn through in two planes, and the bone was restored to its normal position by means of a single loop of silver wire. After dividing some soft parts about the astragalus, the latter was forced into its normal position between the malleoli. Although I had succeeded in restoring the parts to their normal relationship to one another, yet the fact that the articular surface of the tibia had been so altered by its connection with the displaced malleolus made me hesitate in giving a favourable prognosis. This was fully borne out by subsequent events, since the present condition of the foot, though vastly better than it was, is far from perfect.

This case showed very well indeed the mode of causation of this fracture, which is altogether wrongly described and illustrated.

The general teaching seems to be that the foot is rotated outwards around an antero-posterior axis, and the fibula is broken transversely above or about the tibio-fibular articulation, the upper end of the lower fragment being driven inwards, this displacement being accentuated by rupture of the internal lateral ligament, or by fracture of the inner malleolus.

Accepting this explanation as true, and surgeons have frequently depicted this supposed condition diagrammatically in order to illustrate these views more clearly, the natural conclusion is, that by forcing the foot into a position of adduction, that traction is exerted upon the lower extremity of the fibula by means of the external lateral ligament, that the upper end of the lower fragment is drawn out from its position of displacement, and is brought into apposition with the lower end of the upper fragment. As a matter of fact, I have never come across a true transverse fracture of the fibula among the several examples of Pott's fracture on which I have operated. The fracture of the fibula is not produced in the manner supposed, but is brought about by a twist of this bone upon its long axis; consequently, the fracture is spiral in character, the length of the spiral varying within wide limits. When the foot is abducted, force is exerted upon the anterior part of the fibular facet by the astragalus, in a direction which is outwards and backwards. Upon the bone immediately behind the facet there is a very great strain exerted, in a direction from without inwards and forwards. Again, upon the lower end of the tibial facet the astragalus presses directly outwards and upwards. As the result of these several forces, the fibula sustains an oblique or spiral fracture, the form of the fracture varying with its position. For instance, if the bone yields above the tibio-fibular articulation, the fracture is more or less spiral in character, while if it traverses the tibio-fibular it is oblique. The upper end of the lower fragment when the bone is broken above the articulation with the tibia, is driven inwards and forwards. In order that the lower fragment be brought into accurate apposition with the upper, it is necessary that force be exerted in directions the reverse of those by which the fracture and the displacement of the lower fragment is produced.

There is no mechanism by means of which such force can be applied, and a surgeon who has ever operated upon this form of fracture has been able to satisfy himself that the manipulations and splints usually made use of are quite inefficient to restore the bone to its normal form.

I presume that no rational surgeon can suppose that any form of massage, however efficient or however early performed, can have any influence in producing accurate apposition of fragments not effected in the first instance.

CASE 6.—B. M., a woman, æt. 38, was admitted under my care in October 1900. She sustained a Pott's fracture sixteen months before, for which she received skilful treatment at the time of the accident, the displacement of the foot and lower fragment having been rectified to the satisfaction of the surgeon. Her splints were removed as soon as it was thought safe, and manipulation and massage employed. In spite of all this, she was unable to bear her weight upon the damaged limb. In order to improve this condition, she was admitted into a large general



hospital, where massage and manipulation were again resorted to, with no benefit being obtained from it. She was then advised to submit to amputation, which she declined temporarily, in order that she might have an opportunity of trying some less radical measures. She then came under my care. The foot presented the deformity that is so common in this fracture, the outer surface of the astragalus articulating with the displaced fragment of the fibula. As in the preceding cases, the fracture was exposed, the bone was sawn through; the astragalus was restored to its normal relationship to the tibia, when the fibular fragments were fixed together securely with silver wire.

The foot is at the present time in very good position, and I trust that she will suffer only a moderate amount of discomfort from it in future.

CASE 7.—W. S., æt. 61, was one very similar to that illustrated by Plate II. except that this patient was much older. He was admitted under my care in April 1900. He was treated in an hospital for eight months, when he was discharged in a hopeless condition. Besides the deformity and shortening, which were very considerable, the man was quite unable to bear his weight on the limb. The displacement in this case was practically identical in character with that present in the governess. A similar operation was performed, but in this case I exerted an enormous strain upon the fragments, both by traction in the limb and trunk, and by forcible leverage by a stout steel elevator placed between the fragments. In this manner I found I was able to stretch the soft parts in a very definite manner, but when the strain was removed they returned to their original condition. Taking advantage of this, I sawed the ends obliquely, then, having stretched the parts, the surfaces were retained in accurate apposition by means of lion forceps, when they were fixed immovably in position by screws. This patient derived very great benefit from the operation, since he was able to bear his weight securely and comfortably upon a strong femur. The shortening was reduced very considerably by the enormous force I exerted on the fragments.

CASE 8.—L. E. C., æt. 18, a painter up to the time of the accident, sustained a fracture of the tibia and fibula in the early part of 1896. The fracture was produced by indirect violence, that of the tibia being in its lower third, while that of the fibula was in its upper third. The displacement of the lower fragment of the tibia was the usual one under these conditions, namely, backwards outwards, and upwards. He had been treated by a Croft, and the bones had united firmly and securely. The lower fragments had been rotated through an angle of 45° upon the upper, the foot on the damaged side being so placed that its inner margin was vertical, while its fellow occupied the normal relationship to this plane. The great toe, inner margin of the patella, and anterior superior spine, were in the same straight line. The surgeon under whose care the patient had been was a well-known surgeon. When I saw him he was quite unable to walk or to follow any useful occupation, and this has been the case during the three years that have elapsed since he sustained the injury. His inability to walk is due to pain in and about the ankle-joint, consequent on the alteration of his mechanics.

I would point out that he is quite young. I have not yet been able to make arrangements to operate on him.

CASE 9.—W. C., æt. 18, sustained a transverse fracture of the os calcis in November 1893, when he was admitted into Guy's, under my care. Although the foot was very much swollen, it was possible to make out that the anterior fragment was considerably displaced upon the posterior, but it was found impossible to restore the fragments accurately to their normal relationship. The boy was urged to submit to some cutting operation by means of which the bone could be restored to its original form, but he would not agree to this. Consequently we did the best we could under the circumstances, with manipulation and plaster of Paris. The boy recovered, and left the hospital. He returned at intervals, saying that he could not bear his weight on the foot, because of pain in the seat of the fracture, where some irregularity could be felt very clearly. After nine months had elapsed since the receipt of the injury, and as there was no improvement in his condition, I cut down upon the seat of fracture. It was then apparent that in order to restore the anterior fragment to its normal relationship to the rest of the bone, it was necessary to excise a wedge-shaped piece. This was done, and the sawn surfaces were retained in accurate apposition by a long screw. The boy recovered rapidly, and made no further complaint of pain, but set to work very soon after.

CASE 10.—P. D., æt. 43, was admitted under my care in July 1900. He had been a miner, and while fixing a log in a mine ten months previously, he sustained a fracture of the leg from a fall of earth. He had not been able to do any work since the accident, because of great pain in and about the ankle-joint when he put his weight upon the limb. Both bones were broken at about the same level, at the junction of the middle and lower thirds. The lower fragment of the tibia was displaced backwards and outwards upon the upper, which it overlapped to the extent of an inch. The fibular fragments were similarly displaced. The bones seemed to have united firmly. The seats of fracture were exposed, and the bones were sawn through in such planes as permitted of their being brought accurately together, with the axis of the fragments in almost perfect continuity. The tibial connection was effected by screws, and that of the fibula by wire. The patient was discharged on the 7th August, having made an uninterrupted recovery.

I think I have described a sufficient number of these cases of badly united fractures, accompanied by symptoms sufficiently severe to make some sort of operation necessary, and also to show that very bad results occur not unfrequently in the practice of surgeons of the greatest eminence. I will now relate briefly the notes of a few cases of ununited fractures, which cases come about, in my opinion, simply and solely from no other cause than improper or inefficient treatment, whichever you like to call it; and I would point out that in none of these cases was failure to establish bony union due to any other cause than the inefficacy of the treatment employed.



I have carefully avoided referring to the very common ununited fractures of the olecranon, acromion, and patella, but have restricted myself solely to such fractures as surgeons pretend to cure successfully.

CASE 11.—G. G., æt. 29, was admitted under my care in November 1890, suffering from an ununited fracture of the ulna, just above its centre. There was apparently much displacement of the fragments, for, besides the loss of power due to the non-union, there was very limited pronation and supination. The fracture had been sustained three months before, and the physical depreciation was such that the patient was quite unable to follow his employment. I operated on the part and fastened the fragments together with wire. This, unfortunately, failed in effecting bony union, consequently I made another attempt with complete success in December.

CASE 12.—C. B., æt. 48, a labouring man, was admitted under my care in November 1892. He was suffering from an ununited fracture of the tibia and fibula. When he sustained the fracture he was treated with a back splint and the usual vertical footpiece with side splints. The bones did not unite. Efforts were made to obtain union by means of plaster cases, etc., but without avail. Finally, he came under my care. The foot of the injured side was so placed that its inner margin was vertical, while between the vertical and the inner margin of its fellow existed the normal angle of 45° to 50° . The seats of fracture were exposed, and the ends were so shaped as to restore the axes of the fragments to their normal relationship. They were fixed immovably together. Firm bony union ensued, and the patient obtained a serviceable limb, in which the rotation of the lower fragments of the tibia and of the foot were restored to the normal. This case showed very well the utter absurdity of using the vertical footpiece.

CASE 13.—C. S., æt. 45, was admitted under my care in April 1899, suffering from non-union of fractures of the tibia, which traversed the tibia and fibula in their middle third. The injury had been sustained in March 1898, when he was thrown out of a cart, the wheel passing over his left leg. The tibial fragments were exposed, when the fracture was found to be very oblique, their ends overlapping for $1\frac{1}{2}$ in. The ends were made to fit, and were connected with wire. In May, though the tibial junction was secure, that of the fibula was still ununited. This was therefore exposed and its sawn surfaces were retained in accurate apposition by means of wire. This bone also united perfectly, and the patient obtained a very useful limb.

CASE 14.—G. N., æt. 27, was admitted under my care in July 1898, suffering from a condition of non-union of the tibia and fibula in their upper thirds. There was much displacement of the fragments, and though an interval of four months had elapsed since the receipt of the injury, the bones moved very freely on one another. The fractures were exposed, when the difficulty of fixing them accurately together by means of the screw was found to be very great. Indeed, it seemed almost if not quite impossible; as I feared, the operation was a failure,

and as there seemed to be no hope of success, I amputated the leg in September.

CASE 15.—G. C., æt. 41, sustained a compound fracture of the left humerus about its centre in November 1895, when he was treated by splints. An ununited fracture resulted. In February 1896 he was admitted into an infirmary, where he was operated on for this condition, but without success. Wire was used as the uniting medium. As a result of this operation, paralysis of the musculo-spiral ensued. In June 1896 he was admitted to a London hospital, and underwent another operation with the same result. The old loop of wire was removed, and the same material was again employed as a uniting medium. In August of the same year he was admitted under my care. The bone was then restored as perfectly as possible to its original form, being divided in two oblique planes, and I fixed the fragments accurately and immovably together by means of a screw. Firm bony union resulted, though the paralysis remained as before.

CASE 16.—E. J., æt. 39, in May 1897 sustained a fracture of the radius at the junction of the upper three-fourths with the lower fourth, as the result of a direct injury. He was treated by means of splints for seven weeks, at the end of which time it was found that the fragments had not united by bone. He was admitted into Guy's under my care in October of the same year. He had then an ununited fracture, the lower fragment being displaced backwards and upwards upon the upper, not only producing insecurity of the part, but also limiting very considerably any pronation or supination of the forearm. The seat of fracture was freely exposed, and the ends of the fragments were sawn through in planes such as allowed of their being brought into accurate apposition. They were retained immovably in this position by a screw. There was some slight suppuration in the superficial parts, but the fragments united firmly by bone, and a useful arm with a good range of movement was obtained.

CASE 17.—W. K., a seaman, æt. 41, sustained a fracture of the left humerus in January 1895. He was put up in splints. When these were removed, it was found that the fragments were not united by bone. From that time he underwent nine different operations, with the object of establishing bony union. Some of these operations had been performed abroad, and some in London hospitals. The range of movement in the elbow-joint was limited, the patient being unable to extend the arm beyond an angle of 140°. In November 1899 I exposed the seat of the fracture, and found the ends of the bone were connected by thin silver wire, which could have served no useful purpose whatever. The ends of the fragments were sawn through, so as to afford suitable apposing surfaces. These were fixed firmly together with a screw. When the dressing was changed, the limitation in the range of movement of the elbow-joint was forgotten, and in consequence of this enough force was used to separate the fragments from one another. Again, in February 1900, the fragments were freed, and oblique surfaces of bone were obtained. These were united as before. This time bony union ensued, and the patient has now got

a humerus which is strong, but much shorter than its fellow, since each fragment had been curtailed in its length on no less than eleven different occasions. A sinus remained, leading down to the screw, which was subsequently removed.

CASE 18.—T. W., æt. 43. He had been a sailor, and about eighteen months before his admission had sustained a fracture of the tibia and fibula about the middle third of the leg. The leg was retained in splints for six weeks. At the end of this time it was found that the fragments showed no signs of union. He was then placed in a hospital, where he was treated for some time, but without success. An operation was then performed, and the fragments were connected by silver wire. After a sufficient time had elapsed, the leg was examined, when it was found to be in the same unsatisfactory condition as before. He was informed that the condition of non-union was due to some defect in his system, and he was discharged. He was admitted under my care in February 1898. He was unable to bear his weight upon the limb, because of very imperfect fibrous union between the fragments. The seats of fracture were exposed, and suitable bony surfaces were obtained by the use of the saw. These were held in accurate apposition, and were retained immovably together by means of screws. During the course of the operation, loops of wire were found embedded in the bone. The wire was too thin to serve any useful purpose. The patient made an uninterrupted recovery, and obtained a sound and useful limb.

CASE 19.—J. H., æt. 42, sustained a fracture of the tibia and fibula in their lower thirds in the commencement of 1897. He was admitted into a London hospital, where he was under the care of a very accomplished surgeon. He left the hospital with an ununited fracture of the tibia. He went about on crutches for eight months, at the end of which time he was readmitted, and an operation was performed with the object of effecting union between the fragments. This operation was unfortunately unsuccessful. He was admitted under my care in May 1898, having been unable to use his leg for nearly seventeen months, during which time he had been obliged to depend on his friends for subsistence. The fractures were exposed, and the fragments sawn through in oblique planes. These surfaces were fastened immovably together with screws. He recovered with a useful though a shortened limb.

CASE 20.—L. W., a girl, æt. 14, was admitted under my care in March 1899. She had sustained a fracture of the right ulna, just above its centre, in June 1898. Since the time of the injury she had had but very limited use in that arm and hand since the forearm was fixed in the semiprone position. This was apparently due partly to varying rotation of the fragments, and partly to some overlapping of the fragments which had forced the head of the radius somewhat forwards out of its place. The seat of fracture was freely exposed, and the extent of the abnormal rotation was carefully gauged. The bone was then sawn through in two planes, in such directions as to effect a normal continuity of the shaft. Traction was made upon the

fragments, in order to restore the head of the radius as far as possible to its normal position, when the fragments were bound securely together by silver wire. The patient recovered with an arm that allowed an almost complete range of movement.

As a marked contrast with the often very unsatisfactory results obtained by the usual treatment of fractures, I have added a radiograph of a case operated on by the house surgeon under my supervision. It was a spiral fracture of the tibia and fibula, accompanied with the usual amount of displacement of the fragments. The fragments were intact, and were retained in perfect apposition by means of a single screw. I need hardly say that the mechanics of the patient were unaffected by the injury. Plate V. represents the condition of the bones when two years had elapsed since the operation.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

A Manual of Medicine. Edited by W. H. ALLCHIN, M.D. (Lond.),
F.R.C.P., F.R.S.E. Vol. I. "General Diseases." London :
Macmillan & Co. Ltd.

THE comparatively brief text-book of earlier times, written by one man, which satisfied former generations of students and practitioners, is now to some extent being superseded by much more lengthy treatises, in which each article is supposed to be written by an expert possessing exceptional knowledge on the special subject. Whether this ideal is always realised, may be open to question ; in so far as it is attained, the method must have advantages, but it almost necessarily involves increased bulk and increased cost.

The present work is evidently intended to combine the advantages of manifold authorship with the convenience of small handy volumes. The articles are somewhat brief necessarily, but this is not always an evil.

This first volume, which is devoted to the consideration of general diseases, is the work of twenty-two writers, mostly physicians or assistant physicians in London hospitals, or teachers in metropolitan medical schools, including various well-known names.

After an introduction, the editor proceeds to define general diseases as those in which the entire body is more or less concerned, with no preponderance of symptoms in any one region, usually acute in character, and commonly associated with fever, or consisting in profound affection of the general nutrition. These general diseases he divides into two groups, according as they are of intrinsic or of extrinsic causation, and these again into five subordinate classes.

It is a difficult matter to classify disease in a manner at once convenient and logical ; the reviewer will therefore hold his peace regarding certain objections which might be raised against this method, merely suggesting that the essential nature of disease, so far as it is known, and its obvious features, seem to him a better and more convenient basis for classification than can be found in etiology ; for example, caisson disease is here classified among maladies excited by atmospheric influences, such as mountain sickness, lightning stroke, or frost-bite, rather than with its more natural congeners the diseases of the spinal cord.

Professor Sims Woodhead further introduces the volume by an interesting paper on the infections, an admirable prelude to the forty-seven papers on febrile infective diseases which follow. He dwells upon the forms and methods of multiplication of microbes, on their cultivation and toxic products, on the mechanism of defence possessed by the tissues, on immunity, on predisposition, and on the general course and character of infective disease. The article terminates with a classification of infections, which is adopted by the remaining writers. The list includes certain recently described, and as yet imperfectly known, maladies, such as kala-azar, oriental sore, verrugas, and Weil's disease.

Limitations of time and space restrict within narrow bounds references to these papers. Dr. Cayley's article on typhoid begins with an account of the life history of Eberth's bacillus, then proceeds to consider the important question of the avenues by which it finds access to the human body; the writer of this notice strongly coincides with him in incriminating the oyster, when that mollusc has inhabited contaminated water; in addition, the cockle and the mussel may carry the poison; so also, as the author points out, may salads and celery; the writer has repeatedly found evidence of fæcal matter in imported French lettuces, showing that they had been irrigated with cesspool water. Unless careful and thorough washing is practised, the risk to the consumer is considerable. Dr. Cayley mentions a type of the disease which most writers omit, but which is not without importance, namely, the afebrile form. In reference to treatment, perhaps scarcely enough credit is given to the use of intestinal antiseptics, such, for example, as benzo-naphthol, which, if commenced early, certainly seems to shorten the attack and to prevent relapses.

Dr. D. B. Lees devotes nineteen pages to the subject of acute and subacute rheumatism. Impressing upon his readers the important doctrine of the great frequency and gravity of the disease in childhood, he expresses the opinion that, beginning to occur at the end of the second year, its frequency rises rapidly, attaining its maximum in the tenth year of life, after which it gradually declines. Dr. Lees in this article, as in all his writings, contends that "affection of the heart in rheumatism is in no sense a complication, it is a characteristic, and the most important, part of the disease," a principle which, if not absolutely true, at any rate is exceedingly near the truth.

He describes the fibrous cutaneous nodules so often seen in children in rheumatic attacks; this, with perhaps a tonsillitis, some sweating and a rise of temperature, may be the only indications of a rheumatic attack in the child, which is gravely imperilling the heart; the frequent absence of arthritis in children is apt to mislead, and to prevent the adoption of those measures which, at any rate in the opinion of the writer of this notice, are likely to lead to the arrest of the valvular mischief. Dr. Lees holds that salicylates are as definitely antagonistic to rheumatism as mercury to syphilis or quinine to malaria; he wisely urges the continuance of the drug in diminished dose for two or three weeks, with rest in bed; this is unquestionably the wisest course, saving much trouble subsequently, and greatly lessening the danger of cardiac complication.

There is much to be said in favour of the volume as a whole, and if the succeeding volumes are equally good, the work may prove a boon to the student and practitioner.

RICHARD CATON.

A Manual of Surgical Treatment. By W. WATSON CHEYNE, M.B., F.R.C.S., F.R.S., and F. F. BURGHARD, M.D., M.S., F.R.C.S. In Six Parts. Part III., "The Treatment of the Surgical Affections of the Bones: Amputations." London: Longmans, Green, & Co. 1900.

PART III. fully maintains the high standard of its predecessors. The first section deals with fractures, and occupies more than half of the volume. The treatment of fractures given in this volume leaves little to be desired. We are pleased to note that instead of mentioning every splint, and every method that the ingenuity of succeeding generations of surgeons has invented, only those are described which experience has led the authors to believe are the best. With reference to the method advocated largely by French surgeons (amongst whom Lucas-Championnière takes the lead), of treating fractures from the first by massage, without, in the majority of cases, employing splints, our authors, though not prepared to entirely discard splints, consider that massage, whilst in no way interfering with the union of the fracture, "puts the limb into a condition in which the patient is able to commence using it freely, as soon as the surgeon has ascertained that the broken bone is sufficiently firmly united to bear the weight of the body."

As a rule, all cases of recent transverse fracture of the olecranon, we are told, are best treated by wiring, and apparently the authors consider that the only conditions in which this treatment is not to be carried out are in grave constitutional diseases, such as diabetes, or where the patient is very old or declines an operation. Surely every surgeon has seen cases in which an almost perfect result has been obtained in a fractured olecranon without having recourse to operative treatment.

No exception can be taken to the treatment recommended for fractures of the patella, namely, wiring after incision. We are glad to note that the subcutaneous operations, on the lines of that devised by Mr. Barker, are condemned as not remedying the essential lesions which tend to prevent bony union; thus they do not remove the torn portions of periosteum and fibrous aponeurosis, which are still left interposed between the fragments, and which offer a bar to bony union.

Section ii., Division 1, "Diseases of Bones," is full of interest, and in fifty pages conveys a large amount of information. We are told that in caseating tuberculous deposits in bone, the tuberculous disease seldom extends any distance into the bone—no more than about an eighth of an inch beyond the actual soft deposit, so that only a thin layer need be removed.

Division 2, "Amputations."—The favourite methods of amputation are well and briefly described, and much sound advice is given; thus, "while no doubt the set operations may be of use in cases of disease, the patient's interests are nearly always better served in the majority of cases in which the surgeon is nowadays called upon to amputate, by

some irregular form of amputation than by one on old-fashioned lines."

As regards drainage, we are told: "It is well in all cases of amputations to employ a drainage tube, which should be kept in for four or five days." Surely many aseptic amputations do not require a drainage tube, and if one be employed, forty-eight hours will in general suffice.

After enumerating the disadvantages of Lisfranc's and Chopart's operations, we read: "In our opinion these operations might, with great advantage, be left out of text-books on operative surgery." A sufficiently startling statement of opinion, but one which is by no means without justification.

Subastragaloid amputation is deservedly pronounced very valuable.

We are glad to observe that the illustrations in this division are certainly better than in the preceding volumes.

HERBERT F. WATERHOUSE.

The Essentials of Regional Anatomy. By RICHARD J. A. BERRY, M.D., F.R.C.S.Ed. Edinburgh and London: William Green & Sons. 1900.

It is a little difficult to know how to place this work. It would be unfair to describe it as a "cram-book," yet it is scarcely to be regarded as a text-book for the ordinary student of medicine. The author in his preface laments—and his lamentation will be echoed by many teachers of the subject—that human anatomy, a study so vital to medical students, has been gradually elbowed more and more out of the place which it used to occupy, and ought still to occupy, in the medical curriculum. "So much time," he says, "is now devoted to, and wasted over, these preliminary and largely unnecessary sciences"—here he alludes to chemistry, physics, biology, and physiology—"that the student of medicine cannot possibly master either the details of his life's work of the future, or its practical foundation—anatomy." Granted that this is in large measure true, we do not think that the remedy for the ill will be found in the direction in which the author seeks it, but in an insistence on the part of anatomical teachers that their subject shall receive due attention, and that students shall not be allowed to pass in it until they have mastered at least such of its details as are essential to the education of the medical practitioner. Dr. Berry endeavours to sift out these details from the mass of anatomical knowledge, and so far as we have been able to see he has presented most of the facts necessary for the medical student in his pages, though we do not quite understand why all account of the brain and the organs of the special senses is omitted. It is not and does not claim to be a dissecting-room book, so that the student will require a manual of that kind in addition to the present volume, and as a companion to his Ellis or Cunningham may find it of considerable value. It is probably inevitable, having regard to the author's intentions, that the facts contained in the book should be somewhat baldly presented to the reader. To those students who have already studied their anatomy,

and wish to refresh their memory for the purposes of final examinations the book may also be useful. It has no illustrations, but then some of the best of the older works were equally destitute of figures; and if the student avails himself of the suggestion that he should decorate the blank pages with which the book is provided with his own drawings from dissections or diagrams, he will find that by that exercise he has acquired a better knowledge of his subject than by studying many pages of plates.

B. C. A. WINDLE.

Lectures on Medical Jurisprudence and Toxicology. By FRED. J. SMITH, M.D., F.R.C.P. London: J. & A. Churchill. 1900.

THIS book consists of thirty lectures which the author is in the habit of delivering to the students at the London Hospital. The author rightly admits that we have already excellent text-books in those of Dixon Mann and of Luff; but unfortunately he appears to have yielded to the suggestion of the publishers, that there was room for a cheaper book. Cheapness, however, is frequently a delusion and a snare; and while the volumes of Dixon Mann and Luff will continue to be useful books of reference to the student, long after he has obtained his diploma, the present volume will prove of little or no value in this respect. It cannot even be said to be a sound "cram" book, since many of the statements contained in it are open to question, and are not in conformity with the views of the best authorities. The author has a pleasant style of writing, and we can quite imagine that the *vivâ voce* delivery of his lectures is interesting and entertaining; but when read in print, they can hardly be said to form a useful addition to the elementary manuals on the subject, or to enhance the reputation of the author.

HARVEY LITTLEJOHN.

Occasional Lectures on the Practice of Medicine; with the Harveian Lectures on Rheumatism of Childhood. By W. B. CHEADLE, M.D., F.R.C.P. London: Smith, Elder, & Co. 1900.

As might be expected from the name of the author, many of the lectures included in this volume apply to the diseases of childhood, but they are none the less valuable for this reason. It will best serve to indicate the nature of the work, if we enumerate the subjects severally discussed in its pages. The first lecture has as its object the giving of practical hints as to the right and the wrong use of tonics in the treatment of disease; in number two, the clinical uses of opium are discussed; followed in turn by lectures directed towards certain minor disorders of childhood, chronic constipation, and dilatation of the colon, rickets in its medical aspects, practical points in the treatment of diseases of the lungs and air passages, chorea, and infantile scurvy. At the end of the book three lectures are included on the rheumatism of childhood.

It will be seen that the field covered by the author is fairly wide. Not the least valuable characteristic of these lectures lies in their everyday application. They treat of conditions rarely dealt with in

sufficient detail in the medical text-books, and which are just those commonly met with in general practice, to the confusion of young practitioners.

A. LOCKHART GILLESPIE.

A Manual of Midwifery. By A. L. GALABIN, M.A., M.D., F.R.C.P.
Fifth Edition. London: J. & A. Churchill. 1900.

THE fifth edition of this standard manual of midwifery has been slightly enlarged, and shows numerous evidences of careful revision, while twenty-nine new figures have been introduced. Considerable changes have been made in the chapter on ectopic gestation, which is now in accordance with the results of recent observation. With regard to the forceps, Dr. Galabin maintains his old position. His criticism of axis traction, by means of movable traction rods, is still based upon the clumsy instrument of Tarnier, the more convenient forceps of this type which have been introduced during the last twenty years being completely ignored. While stating that in many cases a living child can be delivered with axis-traction forceps, where the ordinary instrument has failed, the author does not, as yet, recommend any form of axis-traction forceps for general use. The discussion of puerperal fevers now occupies forty-five pages of the manual, and has been brought thoroughly up to date. It would, however, be of advantage to students and practitioners, were it mentioned in this chapter or elsewhere that a common cause of fever during the puerperium is the absorption of toxic material from the sluggish intestine of the lying-in patient.

With the aid of six micro-photographs, Dr. Galabin points out the resemblances between the trophoblastic masses seen in retained placenta, in vesicular mole, and in deciduoma malignum. Haultain's case, in which chorionic villi were found in the malignant mass, is cited as providing a stage intermediate between vesicular mole and deciduoma as most frequently recorded. While retaining the name "deciduoma," the author holds that in cases like those of Marchand, Neumann, and Haultain, this term is not appropriate, the growth being "a chorionic epithelioma or tropho-blastoma, engrafted from the fœtus upon the mother." The more common cases are considered to be of the same nature as these, since they present the same appearances, but for the absence of villi. The present edition will be found even more valuable than its predecessors as a source of accurate information on obstetric matters.

W. E. FOTHERGILL.

Kurzgefasstes Lehrbuch der Kinderheilkunde für Ärzte und Studierende.
Von Dr. CARL SEITZ. Zweite Aufl. Berlin: S. Karger. 1901.

BOOKS on Diseases of Children may be divided into two classes,—those which deal only with disorders peculiar to early life, and those which attempt the more ambitious task of giving a systematic description of every ill to which children, like all human flesh, are heirs. The volume before us belongs to the second of these divisions; and although

it describes itself (with Teutonic humour) as a "Kurzgefasstes Lehrbuch," extends to nearly 500 8vo pages of closely printed matter. The work divides itself into two sections. The first eighty-nine pages are devoted to general matters, such as the anatomical and physiological peculiarities of childhood, the clinical examination of children, infant feeding, and the therapeutics of early life. This is unquestionably the best part of the book, and contains a vast amount of information, fairly well arranged, and perfectly up to date. The remaining 400 pages are devoted to a systematic description of the diseases of children under the separate headings—(1) Diseases of the newly born; (2) acute infections; (3) chronic infections; (4) general metabolic diseases, including anæmias; (5) diseases of the separate systems.

The subject matter of these different sections is dealt with very unequally. The description of tuberculosis in children, for example, is very full, especially from the pathological point of view, while the almost equally important subject of rickets is dealt with very inadequately. One is surprised, too, to find rheumatism dismissed in a couple of pages, and described as if it were purely a disease of the joints, no reference being made to the general constitutional manifestations of the disease which are so important in early life. Under the section of nervous diseases the important subject of idiocy and its diagnosis is merely touched upon, and no recognisable description is given of simple basal meningitis. We have thought it right to point out these defects in the book, but in justice to the author, it must be admitted that he has collected together a vast amount of useful information, which, however, will be found more instructive by the specialist than the general practitioner, for the book is essentially one for reference, not for systematic reading. We would venture to suggest, too, that in future editions space might be saved by omitting descriptions of some diseases that are surgical rather than medical, and by sparing us such an infliction as five and a half small print pages on toxicology. A corner might thus be found for a few much needed illustrations, of which there is not one from cover to cover, and for a somewhat more extended index.

ROBERT HUTCHISON.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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COATED TONGUES.

Not so many years ago, one of the chief signs, if not actually *the* chief, of diagnostic importance was afforded by the state of the tongue, and many were the different discriminated conditions. Nowadays, perhaps, too little regard is paid to the epithelial activity of the lingual mucous membrane; an example of pendular swing; but there can hardly be any doubt that the appearances presented by the dorsal surface of the tongue are of minor value for diagnosis; seldom pathognomonic, although frequently of corroborative assistance.

Müller (*München. med. Wchnschr.*, August 14, 1900), however, regards the subject from a higher standpoint than that last mentioned, in this according with the general ideas of the public on the question. Authorities differ as to the nature of the process which results in production of a coated tongue; some hold it to be of inflammatory origin, a glossitis; others to be caused by defective removal of epithelial cells, and entanglement of food-particles in the excessive covering. Again, many opine that no intimate connection obtains between conditions of the stomach and states of the tongue; many, that they run parallel.

Müller first refers to the results of examination of the tongue in 500 healthy young and middle-aged persons by Fuchs. He found that only in 38 per cent. was the tongue absolutely "clean"; in 21 per cent. was there a well-marked fur; in 22 per cent. a moderate coating; in 19 per cent. a slight covering. The author obtained very different figures from the examination of 120 old people in health—from 60 to 80 years of age—only 4 per cent. of these showed marked, 11 per cent. moderate, and 18 per cent. slight coatings; in 67 per cent. there was none. He attributes this apparently paradoxical result to the comparative atrophy of the filiform papillæ in elderly subjects; the filaments of which in earlier years play a large part in hindering the removal of cast-off cells, and detaining food-particles mixed with them from the dorsal surface of the tongue.

In 2170 cases of disease the tongue was found to be coated, as shown in the following table :—

	Per cent.
I. Stomach diseases—	
(a) Acute gastritis	<u>82</u>
(b) Chronic gastritis	<u>55</u>
(c) Ulcer	69
(d) Cancer	65
(e) Nervous dyspepsia	68
II. Diphtheria	<u>80</u>
III. Typhoid	<u>82</u>
IV. Scarlet fever	<u>78</u>
V. Lobar Pneumonia	<u>87</u>
Total stomach cases	69

The percentages in the acute diseases are underlined, and all of them stand considerably above those for the more chronic cases, whether the digestive tract is primarily affected or not. The proportion of “dirty tongues” met with in among 200 sufferers from chronic gastritis is, in fact, below that for healthy individuals in youth or of middle age. Microscopic examination of the “furred coatings” yielded evidence that in cancer of the stomach and pulmonary phthisis the number of leucocytes present is invariably excessive.

Other factors, papillary filaments, epithelial cells, bacteria, moulds, and food-stuffs, varied so widely in the amounts found that nothing of value could be drawn from them.

From the data obtained, Müller concludes—(1) Mechanical cleansing of the lingual surface is of great moment. Whenever loss of appetite leads to diminished intake of food, and consequently lessened removal of débris from the tongue by reason of its passage and attrition; or when the condition of the patient induces him to use his tongue little for any purpose, fur collects, and requires mechanical help for removal. (2) In another class of diseases the coating is due to a true desquamative catarrh, in which the micro-organisms of the mouth play a leading part. (3) The “dirtiest” tongues are to be most frequently found in those persons who possess longer *papillæ filiformes* than normal.

Further, in pathological forms, scrapings from the furred surface of the tongue, masses of epithelial cells are much more abundant than in health. If this sign is present, the fur denotes no primary disease of the tongue, but some affection connected with dyspepsia, especially acute in character, or following upon hyperæmia and catarrh of the buccal cavity. The disappearance of a tongue-coating accompanying an acute disease points to a favourable prognosis; in chronic debilitating disorders, the reverse.

Concerning treatment, the author sagely remarks that healthy individuals will naturally jib at a constant matutinal scraping of the tongue; adding that such a procedure might well favour increased production of the coating. The most rational and the best plan of ridding the tongue of fur is by the thorough mastication of solid foods. In pathological conditions a soft toothbrush forms the best agent for removal of the accumulated material.

GASTRIC TETANY.

CHRISTIAN SIMPSON (*Practitioner*, London, September 1900) summarises the literature of this disease preliminary to discussing a case presenting the symptoms of it.

First described by Dana in 1831, tetany was not christened until Corvisart in 1852 wrote an account of it. Trousseau, who had met with forty cases in nursing-mothers, termed it the "rheumatic contraction of nurses." It appears to particularly affect France, South Germany, and Austria. In the Vienna General Hospital 0·75 per cent. of all the nervous cases admitted between 1880-89 were of this character; or 360 in all. In Berlin, on the contrary, only 1 per mille of the nervous cases presented symptoms of it. In the Edinburgh Infirmary from 1891 to 1899 only two cases of tetany are recorded. In America Osler can only find records of six cases up to 1889. Tetany, usually met with in children, may occur at any age. Of Gowers' 142 cases, seventy-eight were under 20 (thirty-five of these under 5). From birth to 20 years of age, and from 50 onwards, males predominate; between 20 and 50, females, *i.e.* during their child-bearing years. In children, tetany is generally associated with rickets, diarrhoea, and intestinal parasites, and is rarely fatal. In adults, numerous pathological conditions have a greater or less connection with it.

The two conditions especially considered in the paper are that following thyroidectomy, and that accompanying gastric complaints.

Wölfler noted seven cases of tetany among seventy thyroidectomised patients; Billroth, thirteen among seventy-eight, or twenty in 148. All Billroth's patients were young females, who developed symptoms of the disease early, and of whom six died. Bramwell has reported two cases of tetany, one after thyroidectomy, which were cured by full doses of thyroid gland.

Kussmaul in 1869 first pointed out the association of tetany with gastric diseases; and more recently the close connection between its occurrence and presence of pyloric or duodenal lesions (92 per cent., Fenwick) has been more particularly observed. The mortality recorded in cases of gastric tetany is striking: 75 per cent. according to some; ten in eleven, or 90·9 per cent., by Frankl-Hochwart. The exciting cause is probably autotoxæmic; Bouveret and Devic ascribe it to the products of alcohol acting on proteid derivatives of peptic digestion, especially where there is hypersecretion of hydrochloric acid. That neurotoxines may be developed and absorbed in cases of dilated stomach, is shown by the instances of multiple neuritis recorded along with this lesion. Similar attacks of neuritis are frequently met with under many of the conditions favouring the occurrence of tetany.

Simpson proceeds to relate the facts pertaining to two cases—one of doubtful nature, and not personally seen; the second a female, æt. 65, a congenital deaf-mute, with considerable hypertrophy of the thyroid of long standing, and a dilated stomach. Marked evidences of tetany appeared, which was not aggravated by lavage (contrary to several previous reported cases). Later, a severe attack of hæmatemesis left her so anæmic that saline injection was performed, eighteen times in all, each time with temporary benefit. For some weeks her mind was

unbalanced. After about six months the patient apparently had made good progress towards recovery, and all the symptoms of tetany had disappeared. Suddenly, without discoverable reason, a relapse took place, and tetany recurred. Coma then set in, with, however, some violent epileptiform convulsions, and death followed.

Post-mortem, the stomach was found to be empty and contracted throughout the pyloric half; the cardiac half being somewhat dilated, and the walls atrophied. A well-marked constriction of the duodenum was found $1\frac{1}{2}$ in. beyond the pylorus, the lumen of the gut only allowing a small quill to pass through it. This probably originated in a duodenal ulcer, the cause of the hæmorrhages noticed during life.

The unusual shape of the stomach, and the discrepancy between its post-mortem position, and capacity and the signs of dilatation presented during life, were interesting. Clifford Allbutt, who examined the specimen, suggests that the dilated cardiac portion and contracted pyloric half supports the view that the first-named part is really a "crop," the second the true muscular stomach.

TETANY AFTER FILIX MAS AND CALOMEL.

DAMMER. (*München. med. Wchnschr.*, November 13, 1900) reports the case of a woman, æt. 35, married, two children, who thirteen years before had been treated with extract of male fern for tapeworm, with success. In July 1900, portions of *Tenia mediocanellata* were found to be again present in her stools, and her own medical attendant ordered her extract of male fern 8 grms. (123 grs.), calomel 0·8 grms. (12·3 grs.), divided into sixteen doses, placed in capsules, two of which (= 15·4 and 1·5 grs.) were to be taken every TEN minutes. After one and a half hours from the beginning of the treatment, she passed an entire tapeworm, but shortly afterwards she experienced general sensations of weakness, and was attacked by typical tetany spasms. These spasms could be stopped by firm pressure on the large vessels and nerves of the arm. Trousseau's and Chovstek's phenomena were well marked. Recovery was complete in three weeks. No morbid lesion of any organ could be detected during the course of the tetany. Treatment consisted of warm baths and hot packing the extremities.

The chief etiological factor concerned in the causation of these symptoms must be considered to be afforded by the drugs given for the expulsion of the tenia; tetany has been described as an accompaniment of helminthiasis, but here the parasite had been dislodged ere the symptoms of this disease appeared; no gastric dyspepsia or dilatation was present; in fact, no other exciting cause could be substantiated. Calomel, considering its constant usage and the freedom from any effects such as above resulting from this, could hardly be blamed. *Per contra*, medical literature contains many records describing toxic symptoms of the gravest character following upon administration of extractum filicis mas. Syncope, headache, profuse sweating, paræsthesiæ, one-sided or complete amaurosis, and albuminuria have been observed. In a number of these cases, "tetany-like contractions," "convulsions," "rigidity of the limbs," are recorded. In only one case, dealt with by Eich, are the special nervous signs significant of tetany intimately represented, but even he

fails to insert all the details required to render a diagnosis of tetany certain. As none of these earlier observers give any indication that they had employed Trousseau's or Chovstek's tests, it is probable that many of the cases considered by them not to be tetany, may have been of this nature.

GASTRECTATIC DYSPNŒA AND PSEUDO-ANGINA.

ABRAMS (*Med. Rec.*, N.Y., September 8, 1900) discusses the evil effects dilated stomachs produce upon the heart, and illustrates his deductions with a series of diagrammatic figures drawn from skiascopic photographs. Some years ago, Abrams reported an extraordinary case in which, by a voluntary swallowing of air, the patient could insufflate his stomach, and by so doing force his heart back behind the lungs, causing complete disappearance of præcordial dulness or percussion. Generally little of the stomach can be discerned on the phoroscopic screen, but two persons were met with in whom the gastric area displayed in Traube's space was considerable, and apparently normal. In one the coincident presence of nervous eructations permitted study of that phenomenon, in the other artificial dilatation of the stomach was produced by the employment of seidlitz powders. In both, the skiagrams show most clearly to how great an extent the heart is displayed by dilatation of the stomach, and emphasises the danger which may attend distension of the stomach in persons with weak hearts, or the likelihood of pseudo-angina and cardiac distress arising from the same cause.

SURGERY.

UNDER THE CHARGE OF

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PRIMARY TUMOURS OF THE PELVIS AND URETER.

ALBARRAN of Paris has written an important series of articles on these tumours. He has collected forty-three cases, including three observed by himself. They may be conveniently divided into two groups, according to their origin from epithelium or from connective tissue.

I. THE EPITHELIAL TUMOURS are by far the more important, and include papillomata, epitheliomata, and transitum forms. These may be again divided into those which assume a papillary or villous character, and those which are sessile and infiltrating.

(a) *Papillary tumours*.—This term is used in the clinical sense to describe those tumours which partake of the character of villous growths; they are the most commonly met with, and are illustrated by eighteen reported cases. They nearly always arise in the pelvis, but frequently extend into the ureter, it may be throughout its whole extent, even into the bladder; the villous growth in the ureter may be

diffuse, and continuous with the original tumour, or may appear as isolated tufts, especially in the lower end of the tumour; these isolated tufts are probably of the nature of grafts from the parent growth. These papillary tumours may be of the nature of innocent papillomata, or they may be malignant; the latter are less finely villous, and have a broader base of attachment; the malignant elements may, however, be only discovered with the microscope in the shape of epithelial invasion and infiltration of the wall of the pelvis at one point in the area of attachment of the tumour. Albarran has no doubt that the innocent papillomata may become malignant, similar to the transitum which is observed in the villous growths of the bladder; the malignancy may only show itself by the recurrence of the tumour on removal. Those having the structure of epitheliomata behave like true cancers, infiltrate the kidney, and give rise to secondary growths.

(b) *The sessile and infiltrating tumours* are cancers which may originate in the pelvis and spread to the ureter, or take origin in the ureter itself. They appear as nodular infiltrations of the wall of the pelvis, friable on the surface, and readily ulcerate. When the ureter is involved, it becomes an indurated cord, with the lumen narrowed and irregular. Microscopically these tumours present the structure of alveolar cancer, columnar or even squamous epithelioma. They may be very malignant, spreading to the kidney, lymphatic glands, peritoneum, liver, and pleura.

Secondary lesions of the kidney in epithelial tumours of the pelvis and ureter.—Whether situated in the pelvis or ureter, they frequently interfere with the escape of urine, and give rise to hydro-nephrosis; if the contents of the dilated pelvis are bloody, the condition is described as hæmato-nephrosis; in either case, if secondary infection take place, the lesion becomes a pyonephrosis. The dilated pelvis and calyces may become filled up by the vegetations of the tumour, and the kidney itself is frequently the seat of chronic interstitial nephritis.

Nothing is known as to the etiology of these tumours; it is significant, however, that calculi have been found in the pelvis in seven out of thirty-two cases.

Clinical features of epithelial tumours.—They are chiefly met with between the ages of 40 and 60, and are a little more common in men than in women. As in renal tumours, there are three cardinal symptoms, bleeding, pain, and the presence of a tumour in the loin. *Hæmaturia* is commonly the first symptom; it is spontaneous, irregular, intermittent, often abundant and painless, and is not influenced by rest. In a small number of cases hæmaturia is absent. *Pain* is a variable symptom, being sometimes absent; when present it is usually of the nature of renal colic, and results from obstruction to the ureter. The presence of a *swelling in the loin* is of frequent occurrence, chiefly because of secondary hydro-nephrosis or hæmato-nephrosis; in eight cases this was the first symptom observed. If the swelling is found to vary in size, and is associated with the characteristic hæmaturia, one should think of a tumour in the pelvis or ureter.

The discovery of elongated epithelial cells in the urine is not conclusive, because these are also found in similar tumours of the bladder; they are not found, however, in renal tumours. In one of Albarran's

cases he was able to demonstrate tufts of villous growth projecting from the vesical orifice of the ureter by means of the cystoscope, and in another case he withdrew bloody urine containing abundant epithelial cells, by catheterising the ureter on the side affected.

Diagnosis.—The clinical features may resemble those of tumours of the kidney, of stone, and of renal retention from other causes, so that the differential diagnosis is often difficult. If the patient presents the characteristic hæmaturia and a hydro-nephrosis in the loin, the presence of a growth in the pelvis or ureter may be reasonably inferred, especially if by means of the cystoscope we include a tumour in the bladder, which would cause hæmaturia, and by involving the ureter might also cause hydro-nephrosis.

Prognosis.—Although many of the tumours are innocent, especially those of the papillary or villous type, the prognosis is always a grave one.

Treatment.—Provided the other kidney is sound, the only satisfactory treatment is by nephrectomy at the earliest possible moment. From the frequency with which the ureter is involved, whether by continuity or by grafts from the parent tumour, it is necessary to explore its lumen with a catheter, and if there is evidence of tumour, the ureter should be removed at the same time. If it is found with the cystoscope that the vesical end of the ureter and adjacent wall of the bladder are involved, a second operation is required—suprapubic cystotomy to remove the stump of the ureter and the affected portion of the bladder.

II. THE CONNECTIVE TISSUE TUMOURS of the pelvis and ureter are rare in comparison with those of epithelial origin. Albarrañ records seven cases in all, of which four were rhabdo-myosarcomata occurring in infants and young children, one myxoma, one angio-sarcoma, and one lymphatic endothelioma. They may project into the cavity of the pelvis as large sessile masses, or as pedunculated polypi, not unlike some of the epithelial tumours, or they may grow in an outward direction. By obstructing the ureter they may cause hydro-, hæmato-, or pyo-nephrosis. Clinically it is almost impossible to differentiate them from tumours of the kidney, as the chief symptom consists in the presence of a tumour. Hæmaturia was present in all three adults, but was only observed in one out of the four children. The prognosis is always serious, because of the rapid growth of the tumour, the gravity of the operation, and the frequency of recurrence. The prospects of cure by nephrectomy are greater in the case of adults than in children.—*Ann. d. mal. d. org. génito-urin.*, Paris, July, September, and October 1900.

PENETRATING ULCERS OF THE STOMACH.

WE have already drawn attention in these abstracts to the recurrence of ulcers of the stomach which penetrate the liver, or pancreas, or abdominal wall. Wikerhauser reports the following cases:—(1) A woman, æt. 46, had suffered intermittently from symptoms of gastric ulcer for seven years; latterly she had become weak, anæmic, and exhausted with pain, which was worse after meals. The stomach was moderately dilated. A hard, painful, immovable tumour, the size of a walnut, was

found above the navel, and from it an ill-defined, tender resistance extended beneath the left costal margin. Laparotomy was performed, and the stomach was found adherent on all sides, with numerous linear and stellate scars in its walls. Below the left costal margin, the stomach was fused with the abdominal wall, so that it was impossible to separate them. An anterior gastro-enterostomy was performed. The patient made a satisfactory recovery, although there was considerable hæmorrhage from the stomach on the fourteenth day after the operation. (2) A woman, æt. 47, had suffered for four years from gastric symptoms, and had noticed a painful swelling above the navel for about six months. She was much emaciated, the belly prominent, the stomach dilated; the swelling in the region of the umbilicus was as large as a hen's egg, and quite immovable. On opening the abdomen, the pylorus was found narrowed and scarred, and the stomach firmly fused with the anterior belly wall over an area of 4 cms. in diameter, above and to the left of the umbilicus; on separating the stomach from the parietes, a gap was found in the former, between the greater and lesser curvatures, and about 3 cms. in diameter; the edges of this gap were cut away, leaving an elliptical opening, into the lower part of which was inserted a loop of jejunum (gastro-enterostomy), while the upper part was closed with sutures. She made an excellent recovery.

Von Cackovic records a case of gastric ulcer which penetrated the abdominal wall and the pancreas; the patient, a woman, æt. 62, had suffered from symptoms of ulcer for seven years; during the last six months she had vomited every day, and she had become very emaciated and bloodless. The stomach was very dilated and extended below the umbilicus; above the navel there was an uneven, hard, tender swelling, which extended upwards below the right costal margin. The abdomen was opened and the stomach was found to be fused with the belly wall below the ensiform cartilage; on separating the adhesions, a broad scar was found in the wall of the stomach running between the curvatures, and in the centre of it an opening into the stomach; this latter was closed by sutures. The pyloric segment of the stomach was indurated and fused by adhesions. An anterior gastro-enterostomy was performed. On the seventh day there was severe hæmorrhage from the stomach, and the patient collapsed and died. In addition to the scarring described on the anterior wall, the sectio revealed further scarring on the posterior wall, and fusion of the stomach with the pancreas. In the interior of the stomach and on its posterior wall there was a deep rounded ulcer, with indurated edges, which proved to be a carcinoma.—*Centralbl. f. Chir.*, Leipzig, August 11, 1900.

NON-CANCEROUS TUMOUR OF THE STOMACH.

VON HACHER draws attention to the fact that tumours originating in the connective tissue or muscular coats of the stomach present clinical features which are quite different from those of cancer. The tumours attain a much greater size, and it is often difficult to recognise whether they originate in the stomach, or in the omentum, mesentery, liver, kidney, or spleen. Stomach symptoms are either absent altogether, or they are

such as might be caused by any tumour pressing on the stomach; in exceptional cases, when they involve the pyloric segment, they may cause stenosis and characteristic vomiting. The tumours met with include myoma, fibro-myoma, sarcoma, and fibro-sarcoma, and myxoma. In those which project into the general peritoneal cavity the treatment varies with the nature of the tumour; in malignant forms, a portion of the stomach wall must be removed along with the tumour. Von Hacher demonstrated a female patient, æt. 26, in whom he had removed a tumour (myxoma), as large as a man's fist, growing from the anterior wall; he resected the portion of stomach involved by the growth; the patient was perfectly well twenty-two months later, and had recently married.—*Centralbl. f. Chir.*, Leipzig, October 13, 1900.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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PUERPERAL GANGRENE OF THE UTERUS.

BUCKMANN (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, Bd. xlii. Heft 3) has collected over forty cases of this disease, which he regards as more frequent than is generally supposed. He observed ten cases in the St. Petersburg Klinik in three years. It is caused by streptococcic infection, the organisms, crowding on the endothelium of the blood vessels, produce thrombi and necrosis of the corresponding part of the uterine wall. The healthy uterine tissue is separated from the infected areas by a clear line of demarcation. Such cases may recover, but in the absence of such a line of separation, the gangrenous process becomes more extensive, and the case ends fatally from sepsis. In addition to the ordinary signs of sepsis, there are to be noted the following points in diagnosing the condition. Immediately after delivery, the uterus remains enlarged, for about three weeks. The discharge, at first blood tinged, becomes coffee coloured, then dirty yellow, finally becoming very fetid and purulent. By the fourth week the necrotic tissue becomes separated, and the discharge and febrile condition subside. The condition is frequently associated with inflammatory œdema in the region of the posterior commissure and perineum. Of forty cases, twenty-seven died, the cause of death being peritonitis following perforation of the uterus, or general sepsis. In the treatment of this disease, Buckmann recommends free stimulation, with vaginal douching, but warns against any intra-uterine treatment on account of the great risk of perforation of the uterus.

FIBROMYOMA AND PREGNANCY.

HOFMEIER (*Ztschr. f. Geburtsh. u. Gynäk.*, Bd. xlii. Heft 3) has collected 550 cases of uterine myoma. Of these, 20·5 per cent. occurred in

unmarried patients; but as Hofmeier finds that of over 11,000 patients consulting him, 25 per cent. were unmarried, the proportion of married to unmarried women with uterine myoma is about the same. Of 436 cases in married women, 26·7 were sterile. This is a fairly high proportion, as 11 to 12 per cent. is the general average of sterility. The average age of the sterile cases was 40, and the duration fifteen years. In many of the cases where the patients were examined early on account of sterility, no trace of fibroid disease could be detected. Of 436 married women with myoma, 313 had been confined. The average number of births was 3·6. Of forty-two cases complicated with large tumours, conception had occurred once or oftener in all,—the age of the patients being in fourteen cases over 40; twenty-four cases, between 30 and 40; and in four cases, under 30. In no case could it be proved that the presence of the myoma had in any way hindered the occurrence of conception.

Pregnancy was normal throughout in thirty-three cases, four cases terminated in abortion, operative interference was necessary in four cases during the course of pregnancy. Operative interference was, however, more frequent during delivery. In four cases it was necessary to perform Cæsarean section, followed by removal of the uterus, in every case successfully. In three cases it was necessary to remove the placenta, two of these being complicated with free hæmorrhage. Of forty-two puerperal patients, two died, one probably from embolism, the other from septic infection.

THE RÔLE OF THE LIVER IN THE PRODUCTION OF ECLAMPSIA.

W. A. NEWMAN DORLAND (*Am. Journ. Obst.*, N.Y., September 1900) states that recently a strong reaction has set in against the theory that all cases of eclampsia are due to renal insufficiency indicated by albuminuria of greater or less intensity. The present tendency is to ascribe the convulsive seizures and the albuminuria to the presence in the blood of a certain toxine or toxins of unknown constitution and origin. The great constancy of hepatic lesions that have been observed in autopsies of women who have died from eclampsia, accompanied by urinary changes indicative of imperfect katabolism, seem to point to auto-intoxication being the cause of the condition, and the liver as the probable source of the poison. While no direct proof of this theory has been given, many arguments in its favour are furnished clinically, pathologically, and experimentally. The organism must constantly fight against the toxic materials contained in the food, and the foreign poisons originated in the economy, and it does this by means of the metabolic organs whose function it is to arrest and transform the toxic principles, namely, intestines, spleen, lymphatic glands, suprarenal capsules, thyroid glands, and liver, and the eliminating organs (the intestines, skin, lungs, and kidneys). The liver fulfils a triple function, namely, it collects toxic substances, transforms toxic substances, and through the antiseptic properties of the bile it reduces intestinal fermentation.

Pregnancy, either by increasing the amount of toxic substance or by favouring organic insufficiency, predisposes to auto-intoxication. The toxicity of the urine is increased in pregnant women for several reasons.

It may be that the excreting products usually contained in the menstrual flow are eliminated by the kidneys during pregnancy; the metabolites of both mother and foetus being discharged through this channel; and owing to the hydræmia incident to pregnancy, the work of the heart and the lungs is increased. There is, in addition, constipation with intestinal fermentation, necessitating the excretion of the kidneys and of the morbid products from the bowel also, and thus increasing the toxicity of the urine. From the excess of work the kidneys are apt to succumb, and cease to eliminate the toxic principles, while the presence of the gravid uterus upon the bladder and ureters tends to cause an associated uræmia and albuminuria.

Pinard states the matter concisely thus: "We must admit that, independently of all previous disease, there is a kind of hepatotoxæmia that is peculiar to pregnancy, and a certain share of the accidents and complications thereof depends directly upon the condition of the liver. The kidney has only a secondary, although sometimes a very important, relation, while albuminuria is more of a habit than a complication, or it may even be, and often is, a sign of hepatic insufficiency." The causes of this latter condition do not include those of renal disease or albuminuria. The signs of liver breakdown are indicated by various digestive symptoms, such as dyspepsia and vomiting (the incoercible vomiting of pregnancy being, according to Hanot, the expression of a slow hepatic auto-infection). Less important symptoms are ptialism, non-albuminuric œdema, pruritus, bronzing of the skin, and pigmentary patches. As the liver inadequacy increases, graver symptoms develop, such as jaundice, acute yellow atrophy, puerperal mania, eclampsia, etc.

The nature of the poison directly responsible for the eclamptic seizure has not yet been proved. Products of metabolism, both in the mother and foetus, are normally changed in the maternal liver into urea and bile salts, whereas in hepatic insufficiency these products accumulate in the blood. Acetone is found in the urine of eclamptic patients, and their breath smells of that substance. It may be concluded that when the foetus and mother send an excess of waste products to the maternal liver, there occurs an acute degeneration and inflammation of the hepatic cells and retention of toxic materials. The relation of acetone to metabolism is so important, that the urine of pregnant women should be systematically examined for it.

Van der Velde has shown that pregnant rabbits are much more sensitive to the action of normal human urine than non-pregnant ones; also that the blood of a pregnant rabbit when injected into another animal is much more toxic than the blood of a non-pregnant rabbit.

Naturally a lessened toxicity of the urine must mean an increased toxicity of the blood. Given a free escape of the nitrogenous elements in the urine, the liability to eclampsia diminishes in direct proportion. The liability to eclampsia does not so much depend upon the amount of albumin in the urine, as upon the daily amount of urine excreted and the relative proportion of solids contained in the total amount.

THERAPEUTICS.

 UNDER THE CHARGE OF

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 THE EFFECT OF NUTRITIVE ENEMATA ON THE GASTRIC SECRETION.

METZGER's object was to determine whether the administration of nutritive enemata caused any secretion of hydrochloric acid. The experiments were made on dogs and human beings. Gastric fistulæ, according to Pavlov's method, were formed on the dogs. The technique of the experiments is as follows. The rectum is cleared out by an enema of water, and then, if after an hour the stomach is empty or gives no congo-reaction, the nutritive enema was administered. Neither water nor water and common salt cause any secretion of HCl. An enema composed of 125 grms. milk, 2 grms. yolk of egg, and 2 grms. of NaCl, caused either no secretion at all or only a very slight one. An enema composed of 100 grms. bouillon, 50 grms. red wine, and 2 grms. NaCl acted differently. In four out of five experiments there was within an hour a secretion of 4 c.c. of a strongly acid character. The secretion followed much quicker than with the egg and milk enema. Further investigation proved that the action depended not on the bouillon but on the wine. Thus wine without bouillon caused in two hours the secretion of 6 c.c. of fluid of a total acidity of 120, and HCl acidity of 110. Experiments carried out on patients gave substantially the same results. The stomach must be empty or contain no hydrochloric acid. The rectum is cleared out by an enema of water, and if after an hour the stomach is still empty, the nutritive enema is administered, and the gastric secretion is tested every half hour. In eight cases egg and milk caused a slimy fluid containing no free HCl. In some cases a little HCl developed after one and a half hours. Bouillon-wine enema, however, gave after half an hour a strongly acid secretion containing free HCl, which usually disappeared in an hour. The active portion is the wine.—*München. med. Wchnschr.*, 1900, No. 45.

LARGE DOSES OF ATROPINE IN INTESTINAL OBSTRUCTION.

In November 1900, at a medical meeting at Grossenhain, Batsch advocated large doses of atropine on the theory that, in many cases, intestinal obstruction is due to paralysis of the motor fibres of the splanchnic nerves, or to an excessive action of the inhibitory nerves of the intestines. In his original communication Batsch gave particulars of several severe cases successfully treated by atropine, and at various times since, further cases have been reported in the *München. med. Wchnschr.* Thus on July 3, 1900, Batsch reports three cases. Case 1 was that of a woman, æt. 45, who had had no motion for eight days. There had been vomiting for five days,—for the last two, of a fæcal character. After all treatment by

enemata and purgatives had failed, she was sent to Batsch for operation. Instead of operating immediately, Batsch injected 0·005 grm. of atropine ($=\frac{1}{13}$ gr.), which caused sleep lasting six hours, when the patient passed, a large soft motion and there was no return of symptoms. Case 2 was that of a man, æt. 35, who was seized with severe abdominal pain while straining at stool. As no relief could be obtained, a specialist was consulted, who advised immediate operation. Batsch then saw the patient, who requested that atropine be tried first. Early on the morning of the third day 0·005 grm. atropine was injected, which by the evening had caused all tenderness to disappear and the abdomen to become less tense. Fæcal vomiting had entirely ceased, but retching persisted. A further injection of 0·005 grm. stopped the retching and caused three large soft motions, and next morning the abdomen was quite soft and only tender at one spot. In the third case, though three injections of atropine were given, fæcal vomiting developed and laparotomy had to be performed, when the obstruction was found to be due to a strong adhesion from old parametritis. In the number for October 23, 1900, Marchinowski reports two cases. A woman, æt. 32, racked herself while lifting a weight, and when seen twelve hours afterwards was collapsed, with abdomen distended and very painful, great peristalsis and eructations, but no flatus or motion. Laudanum and ice were tried for thirty hours without success. On the third day there was dulness on the right side extending to the middle line. Vomiting was constant, and commencing to have a fæcal odour, so in the evening 0·005 grm. atropine was injected. Relief was marked. There was no more vomiting. The pain shifted to the left side, and in six hours flatus and a soft motion were passed. From now on the bowels acted two or three times daily, and the exudation gradually cleared up. On the ninth day, a pseudo-membrane of tubular shape, 15 cms. in length and 3 cms. in diameter, was passed. The other case was that of a man of 62, who had an incarcerated inguinal hernia. Severe symptoms of atropine intoxication have not been noted, though in some cases slight symptoms developed.

SARCOMA CURED BY ARSENIC.

PETRINI reports a case (*Bull. Acad. de méd.*, Paris, Aug. 7, 1900) of sarcoma at the root of the throat with multiple metastasis in the skin, which was cured by the use of cacodylate of sodium. The patient was a man of 40, who had had syphilis. The growth was at first looked upon as syphilitic, but mercury and iodides had no effect on it, and, as metastatic tumours formed, one was cut out and examined, when it was found to be of a sarcomatous nature. Treatment was commenced with 5 cgrms. of the cacodylate, injected into the buttock. The dose was rapidly increased till 10 cgrms. were given daily. After three weeks, as no improvement was noted, one-third of the dose was injected directly into the tumour, when in ten days distinct improvement was noted, and the dose was raised to 14 cgrms. After fifty injections, treatment was stopped for ten days, when 13 cgrms. were injected daily for three weeks. The tumours completely disappeared, leaving only slight marks. Petrini mentions another case which improved under sodium arsenite, as

far as the cutaneous metastases were concerned, but died eventually of an internal recurrence.

ACTION OF ARSENIC.

GAUTIER has an interesting paper (*Bull. Acad. de méd.*, Paris, Aug. 7, 1900) on the rôle of arsenic in the bodily metabolism. Like iodine, arsenic is chiefly contained in the thyroid gland. It is also found in the brain, and the appendages of the skin. The amount in the average thyroid is 0.15 mgrm. It occurs along with iodine in the form of a nucleo-proteid, which is excreted, and stimulates the epidermic tissues chiefly. Normal blood contains only a very faint trace of arsenic, less than 0.05 mgrm. per kilo., whereas menstrual blood contains as much as 0.28 mgrm. In the male, the arsenic is being constantly eliminated by the hairs of the head and beard and epidermic scales. In the female there is much less removed in this way, as the epidermic wear and tear is much less, so that periodically the surplus arsenic gravitates to the genital organs, where, if the woman is not pregnant, it is discharged; but if she be pregnant it is utilised by the foetus. Gautier suggests that, up to the onset of menstruation, the growth of the hair uses up the arsenic, whereas in the adult female there is little growth and falling out of the hair. In males at puberty there is the great development of facial hair, which corresponds to the loss by menstruation. He considers that in the lower animals the growth of the fur or feathers up to the time of rutting, followed by the casting of the coat, represents the male analogy of menstruation. He thinks that this relationship between the epidermic appendages and genital activity holds good also for human beings. Thus pregnant women may suffer from loss of hair, and pigmentation and disturbances of the skin which may be due to the arsenical nucleo-proteid being so much utilised by the foetus that there is not enough available to regulate the nourishment of the skin. In tuberculosis, arsenic may almost entirely disappear from the thyroid gland, and the attendant skin alteration and amenorrhœa yield very rapidly to arsenical treatment, especially if it be combined with small doses of iodine.

EFFECT OF KEEPING ON GLYCERINATED CALF LYMPH.

It is usually stated that, for the first six weeks after its preparation, lymph, if kept on ice, loses the associated micro-organisms, but suffers no diminution in activity. To test this statement, Boisson made a series of inoculations with lymph obtained from a calf inoculated on 20th February. During the period between 5th March and 28th April, 545 men were revaccinated in six batches. After each batch the lymph was returned to the laboratory and was kept on ice. Whenever it was used, cultures were made to determine the number of staphylococci present. All the inoculations were made by Boisson. In only three cases were there complaints of slight axillary adenitis, otherwise there was no serious complication. The author's conclusions are as follows:—Lymph retains a very satisfactory activity for two months. The virulence is less during the second than during the first month. With lymph less

than a month old the eruption is better than with lymph older than one month. There is no parallelism between lymph activity and the number of staphylococci present. Employment of a very fresh lymph does not entail any inconvenience as regards lymphangitis or other complication. Fresh lymph should be preferred if aseptic precautions are used on the calf during the evolution of the eruption.—*Rev. d'hyg.*, Paris, Sept. 20, 1900.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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ON THE ETIOLOGY OF NON-TUBERCULOUS MENINGITIS.

SAUNDBY (*Birming. Med. Rev.*, Nov. 1900) delivered a valuable address on this subject to the Birmingham and Midland Counties Branch of the British Medical Association, which gave rise to an interesting discussion. He states that the registers of the General Hospital, Birmingham, show that, for the last twenty years, the average annual number of cases of meningitis of all kinds has been 6.1, with 3.65 post-mortem examinations; but, up to September 21st of the present year, there have been eleven cases of meningitis admitted into the medical wards, with ten deaths and nine autopsies; of these nine, only two were tuberculous, and of the remainder, two showed cerebro-spinal lepto-meningitis, and three presented post-mortem appearances of posterior basal meningitis. He concludes that not only is there an increase in the number of cases of meningitis, but also that it is probably due to a form of the disease which is either new, or is one from which we have been for many years practically free. He gives a careful clinical and bacteriological account of the two cases which had come under his notice comparatively recently (the bacteriological work in these cases having been done by Dr. Stuart M'Donald). In both cases the diagnosis of cerebro-spinal meningitis had been verified by lumbar puncture during life, and a pure culture of the diplococcus of Still was obtained, *i.e.*, the organism found by him in the cases of simple posterior basal meningitis, described by Lees and Barlow, the morbid condition found post-mortem to be present in both Saundby's cases, and extending therefrom into the cord. In discussing these cases, he classified cases of meningitis thus—(1) Tuberculous meningitis, constituting, at ordinary times, about 90 per cent. of the idiopathic cases of meningitis met with in children. (2) Meningitis following pneumonia, due to the pneumococcus, and to which influenza seems to be a predisposing cause. (3) Meningitis following enteric fever, due to the *Bacillus typhosus*. (4) Septic meningitis, due to the *Staphylococcus pyogenes aureus* or

albus, the *Streptococcus pyogenes*, the *B. pyocyaneus*, etc.; this may be secondary to diseases of the middle ear, etc. (5) Epidemic cerebro-spinal meningitis, due to the *Diplococcus intracellularis* of Weichselbaum. (6) Posterior basal meningitis, as described by Lees and Barlow, due to the diplococcus of Still. The last-named is described by these authors as a disease independent of cerebro-spinal meningitis, although they admit that the more acute of their cases resemble it in many respects. He himself concluded that the disease described by him was identical with simple posterior basal meningitis, and he further inclined to the view that this was not an independent disease, but merely a sporadic form of epidemic cerebro-spinal meningitis, of which they might be the forerunners heralding an actual epidemic. The question was keenly discussed by the various speakers who followed. Dr. Thursfield mentioned that he had examined nine cases of simple posterior basal meningitis, and had found Still's organism in eight of them. From a careful study of the cases, both clinically and bacteriologically, he believed that the diplococcus of Weichselbaum and that of Still were the same, and that the two diseases were identical. Dr. Leith held that the pneumococcus might give rise to a cerebro-spinal meningitis identical with the epidemic variety on the one hand or the chronic sporadic variety on the other, and that the question ought to have a wider basis, and include primary pneumococcal meningitis as well as Weichselbaum's and Still's meningitis. He was of opinion that we were hardly yet in a position to settle whether these three diseases and their three causal organisms were independent of one another or merely varieties of one common form. The question would probably be settled by a further insight into and study of the morphological, biological, and pathogenic characters of the three organisms. The balance of evidence at the present time undoubtedly pointed to the pneumococcus being of a different race from the other two, which were, on the other hand, probably varieties of the same race. There were certain minor differences between the diplococcus of Weichselbaum and that of Still, the most important of which being the lesser virulence of the latter, but they were not at present sufficient to establish a racial difference between them. The difference of virulence might account for the chronicity and sporadicity of simple basal meningitis as compared with the greater severity and epidemicity of epidemic cerebro-spinal meningitis. Dr. Walter Jordan spoke particularly as to the apparent increase of the disease in Birmingham, and showed that the records of the Hospital for Children did not support this view. Dr. Kauffmann came to the same conclusion from the records of the Queen's Hospital, and suggested that there was probably a local area of infection which had supplied the increased number of cases to the General Hospital. Dr. Stacey Wilson gave particulars of a case of chronic cerebro-spinal meningitis under his charge, which had been undoubtedly caused by the pneumococcus. It was one of the cases referred to by Dr. Leith. He also laid stress upon the influenzal origin of some forms of meningitis, and further deprecated the general use of lumbar puncture as a therapeutic measure.

Mitchell Clarke (*Bristol Med.-Chir. Journ.*, June 1900, vol. xviii. No. 68) records two cases of cerebro-spinal meningitis which occurred

within four weeks of one another, although he does not know of any other case having previously occurred in the hospital practice. The one was in a boy of 10, and the other in a youth of 19. The first was carefully observed, but a lumbar puncture was not made. The second died thirty-four hours after admission. The cerebro-spinal exudate in both cases was examined by Dr. Davies, who found therein a diplococcus closely resembling the *Diplococcus intracellularis meningitidis* of Weichselbaum. The pneumococcus was also present in the latter case, apparently accidentally, although the author does not state whether its numbers were such as to indicate a causal relationship to the disease. No mention is made of Still's diplococcus.

RECOVERY FROM TUBERCULOUS CEREBRO-SPINAL MENINGITIS.

It has been so often claimed, and as repeatedly denied, that recovery from tuberculous meningitis is not only possible, but has occurred, that we gladly welcome any fresh light upon the question. The following case, which need not be referred to except in its merest outline, seems therefore to be worthy of notice, as it supplies apparently indubitable proof of the tuberculous nature of the meningitis. Henkel (*München. med. Wchnschr.*, June 5, 1900) records the case, which showed the symptoms of cerebro-spinal meningitis, and which ran a long and tedious course. The nature of the meningitis was cleared up by the finding of the tubercle bacillus in the cerebro-spinal fluid. It may be noted that calomel was the only remedy given internally.

GRANULAR DEGENERATION OF THE RED BLOOD CORPUSCLES AND ITS SIGNIFICANCE IN CLINICAL PATHOLOGY.

MUCH attention has been given to the shape, size, and colour of the red blood corpuscles,—generally called Erythrocytes when spoken of under one name,—and much valuable information as to anæmia can be obtained from them; but few observations with a practical clinical bearing have, so far, been made upon the contents of the erythrocytes other than the hæmoglobin. Grawitz (*Am. Journ. Med. Sc.*, Phila., September 1900) has entered this field, and points out that the erythrocytes frequently show basophile granules. He thinks that they include a degenerative change in the red cells, due to a degeneration in the blood. They are seen only in cases which lead to degeneration of the blood, and vary directly therewith, increasing or diminishing as it increases or diminishes. Hence they may form an index of the patient's progress. They are probably due to the action of deleterious substances in the blood, and are seen in the following diseases:—(1) *Chronic lead poisoning*, often before any other sign or symptom appears. (2) *Malaria*.—They are also to be found in Europeans long resident in the tropics who have not suffered from malaria; but in such cases the granules are larger and not so numerous as in malaria. (3) *Many fevers*, as he found it in mice in which he produced a high temperature artificially. (4) *Pernicious anæmia* and *late lymphadenoma* and *leukæmia*, but not in chlorosis.

(5) *Cancer of stomach or intestine*, where absorption takes place. (6) *Septic diseases*.—It was absent from phthisis pulmonalis, unless suppurating cavities were present. A number of other diseases, such as syphilis, mercurialism, chronic nephritis, chronic hepatic diseases, diabetes, typhoid, and diphtheria, do not cause it.

ACID-RESISTING BACILLI IN THE LOWER ANIMALS.

MURRAY COWIE (*Journ. Exper. Med.*, N. Y., October 25, 1900, vol. v. No. 2) communicates a preliminary study on this subject, in which he comes to the following conclusions:—(1) Acid resisting bacilli are found in many of the lower animals, more especially the horse, cow, dog, guinea-pig, and white rat. In the case of the rabbit and cat no such organisms were detected. (2) Many of these acid-resisting bacilli resemble the tubercle bacillus and the smegma bacillus of man. (3) The acid-resisting organisms are undoubtedly of different species, and there is good reason to believe that the term smegma bacillus denotes not a definite species but rather a group of bacilli having common staining properties. His results need not be given here in more detail, except in the case of the cow, as they go to still further demonstrate the comparative difficulty and unreliability of all attempts to demonstrate microscopically the presence of tubercle bacilli in milk. In the cows chosen there was no evidence of any tuberculous or other disease of the teats or udders, and they had passed the tuberculous test. Scrapings from the moistened teats were stained as for the tubercle bacillus, and many bacilli were found, some of which resembled the tubercle bacillus very closely. Prolonged exposure to the acid did not cause their decolorisation. In all, eight cows were examined for acid-resisting bacilli, with positive results in five, negative in three. Eight preparations were made from the sediment obtained from a centrifugal separator. Each specimen showed many acid resisting bacilli, some of which might easily be mistaken for the tubercle bacillus, particularly if decolorisation with methylated spirits was not employed. Cowie's results serve to strongly support the opinion of experts, that the only reliable method of detecting the tubercle bacillus in milk is by animal inoculation.

PERNICIOUS ANÆMIA.

BILLINGS (*Am. Journ. Med. Sc.*, Phila., November 1900) gives a careful account of twenty cases in which special attention was paid to the changes in the blood. A good clinical account of the cases is also given, but the blood findings are the most important part of his results. Of the twenty cases, twelve were males and eight females. The hæmoglobin varied from 15 to 74 per cent. (It was estimated by means of Von Fleischl's hæmoglobinometer, an instrument inferior in accuracy in the writer's opinion to Oliver's.) The red blood cells varied from 156,000 to 4,000,000. The colour index was in most of them above normal. The specific gravity bore a more constant relation to the number of red cells than the hæmoglobin. During rapid improve-

ment the hæmoglobin contents of the red cells diminishes as it appears to lag behind them and the other solids of the blood. The leucocytes were on the average below normal, but generally increased somewhat during improvement and decreased during decline, although a terminal leucocytosis may occur just before death. There was a relative, not an absolute, increase in the mononuclears, especially the lymphocytes, during the disease. There was a diminution in the polymorphonuclear leucocytes, both relative and absolute. The eosinophiles showed a disposition to increase with improvement and to diminish with decline, but there were many exceptions to this. The myelocytes were most abundant during decline of health, but they appeared to have little diagnostic or prognostic importance. Nucleated red cells were present in every case, though they often disappeared with improvement. The actual number was sometimes very large, amounting to 10,336 per c.mm. in one case; but generally it was small, the average number being seventy-one (the exceptional case excluded). Many fields may therefore have to be searched before finding them. The normoblasts (average sized nucleated red cells) are of little consequence, but the megaloblasts (large nucleated reds) are of diagnostic value. The proportion of megaloblasts varied with the severity and stage of the disease, usually being more numerous than the normoblasts when the disease was advanced. Megaloblasts with irregular nuclei represent a greater degree of degeneration than similar normoblasts. This variety of nucleus is probably rarely seen, if at all, in secondary anæmias. Poikilocytosis was present in all cases, and in no case did it entirely disappear at any stage of the disease. Polychromatophilia was present at some time in all the cases, but was not constant during the course of the disease, more especially during the stage of improvement. The important diagnostic points then were—(1) The high colour index; (2) the severe degree of poikilocytosis; (3) the constant presence of polychromatophilia; (4) the number of megaloblasts, usually predominating over the normoblasts. He considered these points to be pathognomonic of the disease.

DERMATOLOGY.

UNDER THE CHARGE OF

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THE NATURE AND TREATMENT OF ALOPECIA AREATA.

JACQUET has in a series of papers (*Ann. de dermat. et de syph.*, Paris, May, June, August, September 1900), investigated some of the less noticed symptoms of alopecia areata, from a non-bacteriological point of view. He defines it as a moulting of the hair which has become sudden and extensive, owing to certain multiple local and non-specific condi-

tions, kept up by a disturbance of nutrition, of which alterations in the urinary excreta afford in a degree the measure, and manifesting itself among other symptoms by hypotonicity of the tissues. He has abandoned the microbic origin, and doubts, to go no further, the inoculability of the complaint, since, as he remarks, the inoculability of a disease is proved above all by its inoculation, and yet in course of treatment of many cases he has never seen one focus of inoculation, nor has he succeeded in inoculating it after many trials. He admits that there are instances which seem to point to communication, but these may perhaps be explained otherwise. The fall of the hair is the termination of a slow evolution, dating from the arrest of papillary life, causing the instantaneous death of the hair. This is proved by the following observation. Cut short a group of hairs belonging to a small pilary system, a certain number fail to grow again even in the course of months, yet are found to be firmly set. Such are hairs with free bulbs whose evolution is completed, and destined to fall, yet to fall but very slowly. Alopecia areata is but the final link in a long morbid chain. The pre-alopecic period is the most important. Every denuded spot corresponds to an atonic, inelastic, flabby cutaneous area. The atony lessens with the reproduction of hair; there is a double parallelism—atony with alopecia, tonicity with new growth. In the atony three elements are involved—the connective-elastic framework, the unstripped muscles, and the vessels. The elasticity of the connective tissue framework may be wholly lost, as shown by the flaccidity of the region when the skin is pinched up. Among other evidences of the atony of the plain muscles is the fact that the denuded area, when pressed freely, exudes fluid fat and sweat, the latter having accumulated in ampullary dilatations. The vascular reflexes are interfered with, the vasomotor streak is more persistent, there may be capillary pulse. Phlebectasia is common, and appears as small superficial nævoid varicosities and cylindrical distension of the hypodermic trunks. The hair papilla itself is an organ constantly varying and much affected by reflex influences from a distance. It reacts by increase or diminution of vitality, the decadence or even the death of the hair. As to the hair itself, there is nothing to distinguish it from that in various other forms of alopecia, and this is interesting if we are to regard the hypotony of the papilla as the cause of the moulting. There is nothing at all specific in the condition of the hair. While the analysis of the urine revealed no one morbid change, yet the variations observed are consistent with a deep-seated yet ill-defined disturbance of nutrition. We may compare with this the action of acetate of thallium in causing loss of hair, which may be referred to its power of lowering tone. But there is another distant and mysterious factor—the more or less complete arrest of development, or dwarfing of the pilary system, before or after puberty. This may be seen in the imperfect growth or the disappearance of the outer part of the eyebrows, of the hair at the nape of the neck, at the margin of the scalp hair, of the centre of the moustache, or of the sides or centre of the whiskers. The relation of these to alopecia areata are obscure but positive. It is frequent in those who exhibit this agenesis pilorum, and this influences its localisation. The combination seems to point to the development in the future of a hairless

humanity. This Jacquet thinks corresponds to the evolution in the course of ages of the *Homo sapiens*. "Would this be regretted æsthetically? To what purpose? Let us bear in mind that the Romans, among other goddesses, worshipped a smooth Venus (by this seems to be meant, one destitute of hair), and so we may rest content that the mankind of the coming time will lose nothing in grace or beauty." He emphasises the fact that there are many intermediate stages between completely bald areas and those where the hair is thinned. We observe that in some people the hair falls after fatigue, or even after slight over-exertion, and that in normal conditions we lose daily some, the hair papilla having but a limited period of existence. We can thus appreciate by what an infinite series of gradations the physiological loss is connected with baldness. Nothing in fact proves in a fashion more subtle or more cogent, that perfect health is a myth, and that the normal is potential mother of the pathological life. Moulting is in essence rather the growth of a new hair than the fall of an old one. We may thus infer that the underlying principle in alopecia areata is an abortive reproduction of hair. The neurotrophic theory is the sole one which corresponds to the totality of our ideas as to its causation. It should therefore be treated as to its local conditions, and as to the general states which form its atmosphere. Locally, our efforts are to be directed to reawaken the vitality of the hypotonic zones, and to restore the normal tone. Systematic massage repeated many times a day, not restricted to the denuded regions, produces rapidly a state of cutaneous hyperæmia and hyperthermia, which is a chief element in cure. With this is combined friction and percussion by means of a brush. That employed for the latter purpose should have hard bristles, rendered aseptic, in case of injuring the skin, by dipping them in alcohol containing a little castor-oil and perchloride of mercury, then shaking to disperse the superfluous fluid before sharply patting the scalp. At the same time every effort should be made to discover and correct any disorder of health, to promote vigour by every available method, and to banish all sources of enervation. In connection with this subject, Audry of Toulouse draws attention to a peculiar alteration of the nails which he had met with twice in persons affected with alopecia areata (*Journ. d. mal. cutan. et syph.*, Paris, March 1900). This consists in a dark worm-eaten condition of the surface, due to the existence of small punctiform impressions, imparting a rough and dirty appearance to the nails. At a further stage longitudinal grooves appear, the nail is black, its extremity splits and breaks off. In a still more advanced degree the nail disappears in whole or in part, an unguification of the bed only remaining. There was neither pain nor pruritus, and there was no trace of the trichophyton, but search for other micro-organisms does not seem to have been instituted. Without prejudging the real nature, he concludes that those affected with alopecia areata may exhibit singular alterations of the nails, and that these have possibly the same nature and the same cause as the coexistent alopecia.

THERAPEUTIC NOTES.

THE MM. Platon (*Gaz. d. hôp.*, Paris, July 12, 1900), in an article on the "Value of Organic Dressings in the Regeneration of Epithelium," make an important contribution to the management of wounds which are slow in healing. A man had his arm severely burned by the explosion of a paraffin lamp. Under treatment with aristol in powder followed by dressings with feebly saline boiled aseptic water, the wound granulated, but did not heal. The surface was then carefully cleansed by prolonged bathing with the solution just mentioned, and then, in accordance with a suggestion of Amat, the entire lesion was covered with pieces of the inner membrane of the shell of a freshly laid hen's egg. Over these was put a sterilised leaf of tinfoil, to keep in place and to protect the fragments of membrane. Outside this, some absorbent wool and a light bandage. As there was but little suppuration, it was not disturbed for four days. The tinfoil was adherent at the sides of the wound, but free on its surface; beneath it the membrane was intact. When this was raised, a number of whitish dots were exposed, to all appearance epidermic islands. These were scattered irregularly among the granulations. An aseptic dressing of boiled sterilised water was then applied, and renewed in two days. The whitish islands, previously described, have enlarged, and presented the aspect of a fine reticulum. Several days passed, and shortly, under simple protective dressings, a well-defined epidermis showed itself, extremely thin at first, but which soon became more dense, till in eight days the entire wound was covered with healthy skin. Various explanations of the action of the membrane are discussed, and they conclude that it restores the connective tissue to the conditions of normal life, preserving it from mechanical irritation from without and the causes of suppuration, and so placing it in conditions favourable to the growth of cells differentiated towards the epithelial type. The puncture method is lauded by Unna as the most certain and elegant *mode of dealing with residuary points of lupus* after their treatment by grosser measures, or in the case of recurrent nodules. It consists in thrusting into each lupus nest a tiny acuminate spiculum of wood, which has been previously soaked for some days in a solution of perchloride of mercury with salicylic acid, carbolic acid, or creasote. After the point has been pressed in, any protruding portion is snipped off, and a piece of Beiersdorf's mercury and carbolic plaster muslin is laid on. The mechanico-chemical irritation sets up a destructive suppuration, and in course of two days the bits of wood are removed. A difficulty arose to obtain uniformly fine and hard points. Unna turned his attention to natural thorns, and finds (*Monatsh. f. prakt. Dermat.*, Hamburg, Oct. 1, 1900) that the thorns of the gooseberry are admirably suited for his purpose. They are very sharp, and are of such a size as to be readily held between two fingers, and then plunged from 2 to 4 mm. deep in the tissue. He soaks them for half an hour in liq. antimonii chloridi, and then introduces the point into the nodules he desires to treat. The treatment of eczema in children is often such a troublesome affair that any accession to our armamentarium is a distinct gain. Leistikow (*ibid.*, Sept. 1, 1900), from several years' experience,

recommends for scaly, papular, and vesicular forms the following:—
 R Adipis lanæ, zinci oxydati, amyli, āā 5·0; vaselini flavi, 10·0; hydrarg. oxidi flavi, 0·25 to 0·50—*M. Fiat pasta.* For the weeping or crusted forms of eczema rubrum, the zinc ichthyol salve muslin of Beiersdorf, kept in close apposition and changed once in twenty-four hours, cures many cases. But there are instances of weeping eczema in children, which continually recur, and obstinately resist treatment with the salve muslin. For such he has found pyrogallic acid scarcely ever to fail. The amount must be small and the urine carefully watched, yet if the limit of $2\frac{1}{2}$ per cent. be not exceeded, he has not seen any discoloration of the urine arise. The greater the weeping and the more acute the eczema, the weaker must be the dosage; from $\frac{1}{2}$ to 1 per cent. at first, gradually increased to 2. The best and least irritating vehicle is the unguentum caseini of Beiersdorf, composed of an alkaline casein, water, glycerin, and vaseline. This, when rubbed on, forms a rapidly drying, elastic covering, easily washed off. A bath is given in the evening, and this is not contra-indicated even in weeping eczema, the ointment applied, and refreshing sleep follows. The power of relieving itching by the pyrogallic acid in ung. caseini is very great. Should any reddening of the skin, due to the acid, appear, this is removed in a day or two by the zinc ichthyol salve muslin. The treatment of psoriasis of the scalp is not so far very satisfactory, and any suggestion towards its improvement is welcome. Abraham (*Lancet*, London, Sept. 22, 1900) states that for psoriasis of the scalp the most efficacious treatment, in his experience, is an ointment containing 1 drm. of ammoniated mercury and $3\frac{1}{2}$ drms. each of soft soap and vaseline, well rubbed in every night. By these measures, thoroughly carried out, the most inveterate cases can, he believes, be “cured” in a few weeks, and he is not aware that the affection shows more tendency to recur than after any other method of treatment. Indeed, he knows various old patients who were so treated, who have had no return of their psoriasis for many years. Seven years ago Unna introduced his skin masks for the purpose of maintaining dressings soaked in or smeared with various watery or fatty applications in close approximation to the integument. The method has been found of more restricted use than its discoverer anticipated, while the method of hardening the mask has had to be altered. Chromic acid, though it toughened the gelatin, had the disadvantage that traces were dissolved by the moist or oily pads, and irritated the surface. Unna has found (*Monatsh. f. prakt. Dermat.*, Hamburg, Nov. 1, 1900) that three paintings with solution of celluloidin, at intervals of some hours, on the inner and outer sides of the mask, serve to render it sufficiently firm to last several weeks, while it has no erosive action. The three main uses of the mask are in the treatment of lupus vulgaris, after the mass has been got rid of by the employment of the following caustic salve:—
 R Acidi salicylici, liq. antimonii chloridi, āā 2·0; creasoti, ext. cannabis ind., āā 4·0; adipis lanæ, 8·0.—*M.* The surface is dressed under a mask with solutions of corrosive, 1 in 500 to 1000; or of potassium, 1 in 1000 to 10,000 of water; in the intervals of more active treatment of lupus erythematosus, moist dressings, under a mask of weak lead lotion or of the weakest potassium one mentioned above. And,

lastly, a gradual blanching of the capillary flat nævus can be obtained by painting on a watery ichthyol varnish under a mask.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF

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ACUTE LEUKÆMIA IN CHILDHOOD.

DR. MACRAE records (*Johns Hopkins Hosp. Bull.*, Baltimore, May 1900) a case of acute leukæmia, of about a month's duration, in a little boy æt. 3, characterised by anæmia, fever, purpuric rash, blood picture of leukæmia, hæmorrhages, and convulsions, and terminating by death. He draws the following conclusions from a careful analysis of other thirteen recorded cases.

Leukæmia is a relatively rare disease in the first decade, only two cases of that condition having occurred in 3000 autopsies performed by Friedrichshain. As is the case in leukæmia at all ages, a large proportion of the patients were males. There was nothing conclusive in the family history of the thirteen cases investigated, as in only one instance was there any evidence of leukæmia in the family. The previous history of the children revealed nothing of importance, if we except affections of the tonsils, which were present in several of the cases, and which may possibly suggest something of a causal relationship. In the *Lancet*, London, for 1900, vol. i. p. 227, Hunter has referred to the probable association between foci of infection in the mouth, such as carious teeth, and pernicious anæmia, considered as a chronic infective disease.

A possible association with the "lymphatic constitution" must also be considered, although Ewing, who discusses this matter (*N. Y. Med. Journ.*, 1897, vol. ii. p. 37), can trace no direct connection between the two conditions.

The onset is usually sudden, and is accompanied by fever in the majority of cases; but, as a rule, the temperature does not rise very high. Hæmorrhage from the nose, mouth, stomach, bowels, and kidneys, occurred in the majority of the cases, and was accompanied by a purpuric rash. Enlargement of the cervical glands, associated with affections of the mouth and tonsils, occurred in half the cases, whilst general glandular enlargement was present in a smaller proportion. The spleen was enlarged in every case, and the liver also in more than half the series. Miscellaneous symptoms complained of consisted of pains in joints and bones, hemiplegia and priapism.

Marked anæmia was always present. The highest count of corpuscles showed 2,350,000, and the lowest 1,000,000. The percentage of hæmoglobin varied from 40 to 18. The degree of anæmia in those acute cases is

striking, and suggests the possibility of the development of the disease in children already anæmic. The red blood corpuscles did not show any rapid fall while the cases were under observation, the possible explanation being that these children had been suffering for some time from leukæmia in a chronic form, and that what was regarded as the whole course was merely an exacerbation at the end. The duration of the cases varied from four to nine weeks. The diagnosis can only be made with certainty through an examination of the blood. The conditions with which it is most apt to be confounded are—(1) An acute infection, with specially marked throat symptoms—and (2) a hæmorrhagic purpura. In none of the cases did treatment appear to be of any service.

STERILISATION OF MILK.

At the Thirteenth International Medical Congress, Jacobi, in an exhaustive report on artificial alimentation, considers "that domestic daily sterilisation for ten minutes, or pasteurisation for twice that time, of pure fresh milk, is far preferable to the wholesale manufacturing of a marketable stock, which is often kept and sold in non-transparent bottles, in order not to betray its secrets." It is just such milk, which has been kept for a long time, in which cream will permanently separate from the milk. Weber found that the nearer the milk investigated by him approached absolute sterilisation, the more readily could the gross chemical and physical changes occasioned by sterilisation be noticed.

He found Flügge's poisonous peptonising bacteria three times in a hundred and fifty specimens of commercial sterilised milk. They were "hay bacilli," which cause a strong decomposition of albumin, and a copious development of sulphide of hydrogen. It is particularly this rapid putrefaction which proves dangerous to the nursling. Consequently, domestic daily sterilisation is to be preferred to wholesale production, unless this be done daily.

The destruction of microbes by heat forms such a progress over all previous methods of employing milk, that its disadvantages are apt to be overlooked. In some cases heat is insufficient in its effects, obstinate bacteria not being destroyed; in other instances its excessive effect proves dangerous, by destroying milk elements.

While appreciating the latter danger, which is due to prolonged heating mostly, it should never be forgotten that the advantages of heating, by destroying microbes which are either directly pathogenous or indirectly so, by increasing the virulence of the saprophytes, are incalculable. But, with every degree beyond pasteurisation, the disintegration of the milk becomes more marked; therefore it appears that no greater heat than 60° C. (140° F.) should be employed. The lower the degree of heat capable of destroying lactic or pathogenous microbes, the more easily the integrity of the milk is preserved.

This low temperature preserves also the taste of the milk, and is at the border line only of the temperature that coagulates lactalbumin.

While admitting the truth in the main of the impression, which has gained ground in recent years, that sterilisation of milk is respon-

sible for the increase in cases of scurvy, Jacobi considers that this cause has been greatly exaggerated, and supports his opinion by quoting the statistics of the American Pediatric Association. He believes that these cases of scurvy which are attributed to this cause, occur when the milk has been subjected to a very prolonged pasteurisation or sterilisation, which produces changes in its chemical composition, rendering it difficult to assimilate.

NEPHRITIS IN CHILDREN.

DISCUSSING the subject of nephritis at the American Pediatric Society, Rotch calls attention to the striking want of correspondence between the clinical symptoms and the pathological condition of the kidneys. It is almost impossible to make a diagnosis of any special form of renal disease in young children by an examination of the urine, observing the same rules which we are accustomed to follow in forming a diagnosis in adult cases. Often, for instance, we find clinical symptoms corresponding to glomerular nephritis, when the pathological conditions found after death do not conform to that diagnosis. The most important question we have to decide is as to the form of nephritis. The acute interstitial nephritis running an acute course, just as glomerular nephritis does, is more characteristic in young children than it is in adults. An acute interstitial nephritis is usually secondary to some infectious disease, such as diphtheria or measles, while glomerular nephritis is more characteristic of scarlet fever. It would be interesting to see some autopsies following influenza, as it is probable that they would be of the interstitial type. The complication, however, is a rare one. Acute nephritis can only be differentiated from the glomerular variety by post-mortem examination, as there is nothing in the clinical symptoms to distinguish them.

MASSAGE IN ABDOMINAL TUBERCULOSIS.

DURANTE contends in this paper that before advising the operation of laparotomy in cases of tuberculous peritonitis, palliative measures should be given a fair trial, as many cases recover completely without being subjected to surgical interference. He claims a high place for abdominal massage amongst these palliative measures, if employed sufficiently early.

He considers that, in addition to the general beneficial effect produced by improving the nutrition, it has also a very marked local influence on the disease, facilitating not only the absorption of fluid, but by stimulating the action of the bowels it thereby lessens the pressure on the peritoneal surface. It also stimulates the abdominal circulation, and thus helps the process of absorption. The author reports three cases of tuberculous peritonitis in which this treatment was employed, in all of which the fluid was completely absorbed—*Pediatrics*, Napoli, June 1900.

THE DIAGNOSIS OF CONGENITAL HEART DISEASE.

PROFESSOR VON STARCK, while admitting the impossibility of diagnosing the exact character of anomalies present in congenital heart affections, thinks that we should always endeavour to determine the condition, especially as a help to prognosis regarding the duration of life.

The diagnosis of pulmonary stenosis is not as a rule difficult, the symptoms being cyanosis dating from birth, hypertrophy of the right ventricle, a systolic murmur over the second left intercostal space, which is not transmitted into the vessels of the neck, and weakening of the second pulmonary sound. Eventually we get clubbing of the fingers, and other evidences of venous stasis.

The determination of a patent ductus arteriosus has often been confirmed at the post-mortem examination. The following are the signs: hypertrophy of the right ventricle, a systolic murmur over the sternal end of the second left interspace, transmitted into the vessels of the neck, and an accentuated second pulmonary sound. Cyanosis is often absent in these cases. The recognition of a patent septum is often impossible, and when it occurs, it is generally accompanied by stenosis of the pulmonary artery. An important point in the differential diagnosis of the two conditions is to be found in the quality of the pulse. In uncomplicated stenosis the pulse is weak and small, whereas in stenosis with deficient septum it is practically normal.—*Arch. f. Kinderheilk.*, Stuttgart, Bd. xxviii. Heft 3 and 4.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—*December 5, 1900.*—

Mr. A. G. MILLER, President, in the chair.—Dr. BYROM BRAMWELL showed a case of tabes in which the toe reflex (Babinski's sign) is extension instead of flexion, the explanation of this being that the patient had had an attack of hemiplegia which had caused considerable wasting of the flexor muscles.—Dr. M'KENZIE JOHNSTON showed, for Mr. ALEXIS THOMSON, a patient, æt. 24, after complete excision of the larynx for epithelioma (with specimen and microscopic slide of tumour).—Mr. STILES showed—(1) A boy after removal of large simple lymphoma of the neck (with specimen), (2) a girl six months after amputation at the hip and removal of the greater part of the innominate bone for tuberculous disease. A skiagram of the pelvis by Dr. RAINY was shown.—Dr. ELDER showed—(1) Brains showing four different seats of cerebral hæmorrhage, namely, into the internal capsule; into the external capsule and through the temporo-sphenoidal lobe to the surface; into the tip of the temporo-sphenoidal lobe; into the cortex of the occipital lobe; (2) tumour of the dorsal vertebræ pressing on the spinal cord, from a case of paraplegia.—Dr. BRAMWELL showed—(1) A large tumour of the motor centres and centrum ovale; there was no paralysis, but reaction to the faradic current was quite abolished; (2) a skull-cap from a patient who died three months after the operation for trephining in a case of cerebral tumour.—Dr. D. C. WATSON showed a thermal bath cabinet for home use.—Professor CHIENE read a paper on "Experiences in South Africa." It appears in this number of the Journal.

SPECIAL CLINICAL MEETING, *December 19, 1900.*—Mr. A. G. MILLER, President, in the chair.—Dr. M'KENZIE JOHNSTON showed a patient with a large neoplasm situated in the left tonsil.—Dr. BYROM BRAMWELL showed—(1) A case of aneurysm of the thoracic aorta, successfully treated by iodide of potassium; (2) three cases of tabes, in which great improvement has resulted from the treatment by co-ordinated exercises (Fränkel's method).—Mr. ALEXIS THOMSON showed a patient showing the result of resection of the middle two-thirds of the tibia for central abscess.—Mr. SHAW M'LAREN showed—(1) A case of psoas-abscess after treatment by iodoform emulsion injection; (2) a patient with tuberculous wrist treated by iodoform emulsion injection plus congestive treatment; (3) patient after complete removal of the tongue and glands on both sides of the neck for cancer two years ago.—Dr. NORMAN WALKER showed—(1) A case of morphœa; (2) a case of favus.—Mr. STILES showed—(1) A patient after operation for ruptured gastric ulcer, five hours after rupture; (2) complete avulsion of the scalp, showing result of skin grafting; (3) infant 3½ months old, after removal of large occipital meningocele 16 in. in circumference (with specimen); (4) infant 4 months old, after operation for acute intussusception; (5) a boy with paralysis of the right gluteus maximus, the result of acute anterior poliomyelitis.—Professor ANNANDALE and Dr. BRUCE showed a case of paralysis after removal of twelfth dorsal lamina.—Dr. ALLAN JAMIESON showed microscopic specimens from the case of cervical skin tumours shown at the November meeting.—Mr. ALEXIS THOMSON showed the deformed shaft of a tibia showing two

circumscribed (Brodie's) abscesses in its interior, the result of an antecedent osteomyelitis.—Mr. SHAW M'LAREN showed—(1) A recent Pott's fracture; (2) radiograph of fractured internal condyle of humerus, lodged between humerus and ulna; (3) radiograph of fracture of astragalus, with sub-astragaloid dislocation of foot forwards.—Mr. STILES showed—(1) Portion of hat-pin ($3\frac{1}{2}$ in. long) removed from the male bladder by suprapubic cystotomy; (2) brain showing abscesses secondary to an injury to the head; (3) congenital fatty tumour from the axilla of an infant.—Dr. HARVEY LITTLEJOHN showed—(1) Brain from a case of apoplexy, partial recovery; suicide by cut-throat six weeks afterwards; (2) cut-throat from above case; (3) complete rupture of small intestine from a simple fall; (4) double uterus; (5) specimen of acute inflammation of the stomach.

EDINBURGH OBSTETRICAL SOCIETY.—*December 12, 1900.*—Dr. MILNE MURRAY, President, in the chair.—SPECIMENS.—The PRESIDENT showed—(a) Dermoid ovarian tumour and ovary with recent corpus luteum, (b) myoma of rapid growth removed by hysterectomy.—Dr. BREWIS showed—(a) fibro-cystic tumour of the broad ligament, (b) uterus removed for cancer of the body, (c) ovarian abscess and pyosalpinx, (d) fibro-myoma removed by subperitoneal hysterectomy.—Dr. HAULTAIN showed—(a) Omphalopagus twin monster, (b) fibroid uterus removed by pan-hysterectomy, (c) cancerous uterus removed by vaginal route from a patient æt. 29, with curious obstetric history, (d) extra-uterine gestation removed by laparotomy.—Dr. SCOTT MACGREGOR showed a uterus removed by vaginal hysterectomy for early cancer of the cervix.—Dr. BARBOUR SIMPSON showed a pessary which had been retained for fifteen years in the vagina.—Professor SIMPSON showed a ruptured ovarian cystoma. COMMUNICATIONS.—Dr. MUNRO KERR (Glasgow), read a paper on "Spoon-shaped Indentations in the Skulls of the New-born, with illustrative cases, and a new method of treatment for the immediate relief of the deformity." He pointed out that French obstetricians had always given greatest attention to this subject, while in Britain little notice was taken of it. Dr. Kerr considered the causation of the accident, and pointed out that it was chiefly due to a fault on the part of the maternal bony passages. In Glasgow it was not uncommon, because of the frequency of flat rachitic pelves. He discussed the prognosis of the cases, and described the operative treatment usually adopted. In conclusion, Dr. Kerr described the treatment he had adopted with marked success in some cases. It was very simple and speedy, and consisted merely in the compression of the head, generally antero-posteriorly, which resulted in the springing out of the indentation on the foetal skull.—Dr. MICHAEL DEWAR read a clinical note of a case of eclampsia at the sixth month, with successful labour at full time. He first of all narrated the case, which was that of a primipara, who, at the sixth month, had within a week three series of convulsions. During the first and third there was no albumin in the urine, while in the urine obtained during the second attack of convulsions there was a trace. The patient had, however, all the other symptoms of eclampsia. She got well, and had a normal labour at full time. Dr. Dewar made remarks on the diagnosis, etiology, and treatment of eclampsia.

ROYAL MEDICAL SOCIETY.—*December 7.*—Dr. STUART in the chair.—Dr. L. C. PEEL RITCHIE delivered an address on “Heredity,” giving an account of the views of Darwin and of the later views of Weissman, and showing how the latter’s lead to the conclusion that acquired characteristics are not inherited, and that environment is the more important factor.—Dr. F. S. ROSE read a dissertation on some complications of gonorrhœa.—Dr. HENDERSON read a paper on “Quacks and Quackery.”

GLASGOW MEDICO - CHIRURGICAL SOCIETY.—*December 7, 1900.*—Dr. G. K. LOVE showed two cases of double congenital ptosis, occurring in father and daughter. A boy in the same family was free from ptosis, but a baby girl showed it markedly. In the case of the father, removal of a strip of skin from both eyelids was followed by a good result.—Dr. A. A. YOUNG showed a case of empyema of the gall-bladder in a child 6 years old. There was a swelling in the right epigastric and hypochondriac regions. The skin was reddened and thinned over a small area, and fluctuation was distinct. The swelling was incised, and a large quantity of pus evacuated. A probe, which was inserted into the wound, passed under the edge of the liver, which could be distinctly felt. An examination of the pus showed the presence of bile pigments, mucin, and pus corpuscles, but no micro-organisms. After the wound healed, no enlargement or tenderness of the gall-bladder could be felt. There was no history of gall stones.—Dr. GRANT ANDREW read a paper on “Tuberculous Disease of the Hip-joint, a Critical Examination of Seventy Cases : a Plea for the Founding of a Special Hospital for Hip-joint Disease.”—Dr. LINDSAY STEVEN showed a specimen of cerebellar tumour from a boy 9 years old, in which the chief symptom was daily vomiting of several months’ duration. The ventricles were dilated with fluid. The fourth ventricle was filled with a nodulated tumour growing from the left lobe of the cerebellum. The tumour—a gliosarcoma—which was the size of a walnut, was also visible at the base of the brain.

GLASGOW PATHOLOGICAL AND CLINICAL SOCIETY.—*December 10, 1900.*—The PRESIDENT, Mr. H. E. CLARK, in the chair.—Dr. JAMES CARSLAW showed two patients—(a) A case of peripheral neuritis as a complication of enteric fever; (b) a case of hemiplegia occurring in the course of enteric fever, but probably the result of mitral stenosis.—Professor MUIR gave a microscopical and lantern demonstration illustrating some of the bacteriological features of bubonic plague. In replying to questions, he could not speak authoritatively on the subject of mixed infection. The pneumococcus might be easily overlooked both from its resemblance to some of the forms of plague bacillus, and from the difficulty in making cultures of it in agar media.—Dr. G. T. BEATSON showed a series of skiagrams of tumours connected with bone, and drew attention to the lack of definite information given by the Röntgen rays in such cases.—Dr. A. W. RUSSELL showed a uterus, the seat of multiple myomata. There had been encysted hæmorrhage into the left ovary.—Dr. MUNRO KERR showed as a fresh specimen the lungs and kidneys from a case in which embolism of the pulmonary artery had occurred four days after labour.

OBITUARY.

DEPUTY SURGEON-GENERAL GEORGE MACKAY, M.D., J.P.

By the death of Deputy Surgeon-General GEORGE MACKAY on the 20th of November, Edinburgh has to deplore the loss of one who played no minor part in the branch of medicine chosen as his rôle in life; and who, after retirement, continued to employ his time for the good of his fellow-men.

Fitly a child of the army, George Mackay was a son of Major Mackay, of H.M. 70th Regiment, then (in 1820) stationed at Aberdeen, and a grandson of Colonel Mackay of Bighouse. While still of tender years, his father's regiment was ordered to Canada. Hence he received his early education in that colony, but he was later sent to the Madras College at St. Andrews. Resolving to enter the medical profession, he entered Edinburgh University, and graduated in 1841 as M.D.

Hereditary instincts it may have been which caused him to aspire to a military career; and soon after graduating, he applied for and obtained a commission as surgeon in the Honourable East India Company's service. During the course of his duties in this capacity he saw active warfare in the campaigns against the Mahrattas in 1844, and in Burmah in 1852. The medal and clasp for Pegu were conferred on him, and he was specially thanked for his services during the campaign.

After this last war-service he settled at Coimbatore as a civil surgeon, later on proceeding to Ootacamund. Raised to the rank of Surgeon-Major in 1864, those in authority marked their appreciation of his abilities by appointing him to the post of Examiner of Medical Accounts in the Military Finance Department, an appreciation evinced further by his subsequent appointment to the Secretaryship of the Madras Medical Fund and Military Fund.

Privileged to read a record of service personally written by the late Deputy Surgeon-General, the writer is able to testify to the very varied experiences which fell to his lot, and the constant devotion to duty characterising his entire career. Among a number of points of interest, the fact of his having in 1845 had the courage to attack the then customary and universal method of treating cases of heat-apoplexy by copious bleedings and detergents—notwithstanding the almost invariable fatal result—by advocating and successfully applying a method of treatment of cold to the head, moderate stimulation, and a following purge, very similar to that adopted generally at the present time, bespeaks a man of mettle.

In India he was one of those who first advocated more thorough training of native medical subordinates, a movement leading in time to the institution of the Madras Medical College. His philanthropic turn of mind induced him to fill many honorary posts in societies formed for the public weal in India, in addition to his official work. Having served for practically thirty-three years, thirty of which on actual duty, he retired in 1875, first settling in Inverness, but latterly residing in Edinburgh. His leisure time he occupied in aiding the Soldiers' and Sailors' Home, as well as many other philanthropic enterprises.

ANALYTICAL REPORTS.

CEREBOS SALT.

SOME months ago we noticed this preparation, and awarded it very considerable praise. It appears, however, that we were in error in stating that it consisted only of chloride of sodium and phosphate of calcium, for the manufacturers have informed us, along with a further sample forwarded, that phosphates of other metallic bodies have a part in its constitution. Thus it appears that, in addition to the phosphate of lime, phosphates of sodium, magnesium, and other bases are incorporated in it; very closely allied in their proportions and characters to those found in whole wheat meal. The presence of these other compounds of phosphoric acid render it all the more valuable as a ready means of introducing the element of phosphorus into the body in as natural a way as possible, but, apart from this, its chief recommendation to our mind lies in the property conferred in it by the presence of the phosphate of lime, of not "caking"; of preventing deliquescence.

As the total quantity of phosphorus which can possibly be taken along with Cerebos Salt, when used at table as a condiment, can never be large enough to exercise much influence upon the organism (although the little may always help to some degree), it can hardly be regarded as a potent phosphoric adjuvant. If, however, it be used also in culinary operations, as suggested by the manufacturers, the intake of phosphorus may reach considerable proportions; and if at meals it be regarded as a useful addition, rather than as a mere accessory, and taken in larger amounts, beneficial results such as are claimed for it may quite rationally be looked for.

Cerebos is certainly a most elegant table preparation of salt, and one which, in suitable circumstances, is the more beneficial the greater the quantity taken within reason.

SHREDDED WHEAT.

(The Shredded Wheat Co., Worcester, Mass.)

WE have received a sample of Shredded Whole Wheat Biscuits, manufactured by the Shredded Wheat Company. These biscuits are very unlike, in appearance, texture, and shape, the biscuits usually met with in this country. Each biscuit only weighs close upon 1.125 oz., although it is 4 in. long, 3 in. wide, and nearly 1½ in. thick. To look at, it seems to consist of a carelessly wound hank of pack-thread—long pale yellow filaments being loosely laid over one another. The

process of manufacture of these biscuits is most interesting. Whole wheat grains, after thorough washing, are placed in large wire tumblers, and are then submerged under boiling water until thoroughly cooked; the tumbler, meanwhile, constantly revolving. This, the first cooking. The wheat is then passed on to the hoppers of a shredding machine, a machine 104 ft. long, containing thirty-six pairs of shredding rolls; each of which deposits continuously about eighty shreds into spaces 4 in. long in wooden troughs, carried under all the rolls by a belt. When each trough has received the shreds from all the rolls, it contains the thickness of a biscuit; and further, on passing under a series of knives, the shreds are cut into final form. These are then baked at a high degree of heat. This, the second cooking. Finally, they are placed in an oven at a lower heat, and kept there from five to six hours. This, the third and last cooking.

Analysis of the shredded wheat biscuit yields the following percentage results, to which the mean composition of ordinary whole wheat meal, white bread, whole meal bread and biscuits are added for comparison:—

	Shredded Whole Wheat Biscuit.	Whole Wheat	White Bread.	Whole Meal Bread.	Ordinary English Biscuits.
Moisture at 110° .	10.5	12.1	39	45	7.45
Total solids . .	89.5	87.9	61	55	92.55
Ash	2.61	1.2	1.0	1.2	0.83
Organic solids . .	86.89	86.7	60	53.8	91.72
Proteids . . .	12.18	12.9	6.5	6.3	7.18
Fat	1.11	1.9	1.0	1.2	9.28
Carbohydrates .	70.98	70.3	51.5	45.3	75.10
Cellulose. . .	2.62	1.6	1.0	1.0	0.16

The shredded whole meal biscuits are therefore richer in inorganic solids than any of the other products of wheat included above, and even than ordinary oatmeal. They naturally contain less moisture than meal or bread, but the ordinary type of biscuit made in this country is considerably drier. The proportion of fat is less than in the others, the proteid greater, save when compared with whole meal bread, and the cellulose remainder markedly in excess.

The chief value, however, of these biscuits lies in the fine state of division which their constituent materials have been reduced to, and the large proportion of starch which has been converted into soluble dextrins during the three several applications of heat it has been exposed to. Various recipes are suggested by the makers, wherein the use of these biscuits may with advantage supplant employment of ordinary flour or bread. Theoretically, the preparation looks promising, the finely divided state of its components advantageous to digestive ease; practically, its success in this country depends on the taste buds of the public; and we strongly advise the profession to give it the trial which is alone required to make it a universal article of diet for both "sick" and "well."

MONTHLY NOTES ON METEOROLOGY AND VITAL STATISTICS.

By A. LOCKHART GILLESPIE, M.D., F.R.S.E., F.R.C.P.Ed.,
MEMBER SCOTTISH METEOROLOGICAL SOCIETY.

METEOROLOGICAL MEANS FOR THE EAST OF SCOTLAND DISTRICT, FOR THE FOUR
WEEKS ENDING NOVEMBER 24, 1900; AND FOR THE YEAR FROM JANUARY 1.

	TEMPERATURE.			RAINFALL IN INCHES.		SUNSHINE. HOURS.		Mean Daily Variability of Temperature.
	Mean.	Accumulated Day-Degrees.		Actual.	Accumulated from Jan. 1.	Actual.	Accumulated from Jan. 1.	
		Above 42°.	Below 42°.					
Mean . {	41°·47	*1 89° 2 2317°	72° 756°	2·8	28·6	52	1238	3°·1
Observed {	41°·72	1 73° 2 2226°	80° 809°	4·0	31·9	40	1129	3°·2
Difference {	+0°·25	1 -16° 2 -91°	+8° +53°	+1·2	+3·3	-12	-109	+0°·1

VITAL STATISTICS.

MORTALITY IN FOUR LARGE TOWNS IN THE EAST OF SCOTLAND (EDINBURGH, DUNDEE, ABERDEEN, AND LEITH), DURING NOVEMBER, AND SINCE JANUARY 1, 1900. Actual Numbers and Rate per 10,000 per annum.

	TOTAL.		CONSTITUTIONAL DISEASES.		CIRCULATORY SYSTEM.		RESPIRATORY SYSTEM.		NERVOUS SYSTEM.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1898 {	1 1216 2 12290	210·3 193·2	212 2425	36·8 38·1	104 1152	17·9 18·3	303 2352	52·3 36·9	123 1390	21·3 21·7
Actual Deaths and Rate per 10,000 {	1 1104 2 12266	190·9 192·8	197 2571	34·2 40·4	117 1252	20·3 19·87	234 2250	40·6 35·33	111 1381	19·4 21·56
Difference from Mean {	1 -112 2 -24	-19·4 -0·4	-15 +146	-2·6 +2·3	+13 +100	+2·4 +1·57	-69 -102	-11·7 -1·57	-12 -9	-1·9 -0·14
	DIGESTIVE SYSTEM.		URINARY SYSTEM.		PNEUMONIA.		PHTHISIS.		CANCER.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1898 {	1 72 2 831	12·5 13·1	31 322	5·4 5·1	102 898	17·7 14·1	100 1195	17·4 18·7	52 556	8·97 8·73
Actual Deaths and Rate per 10,000 {	1 84 2 871	14·6 13·73	30 342	5·23 5·4	116 1046	20·2 16·4	79 1232	13·8 19·28	51 598	8·79 9·39
Difference from Mean {	1 +12 2 +40	+2·1 +0·63	-1 +20	-0·17 +0·3	+14 +148	+2·5 +2·3	-21 +37	-3·6 +0·58	-1 +42	-0·18 +0·66

* NOTE.—The figures¹ denotes the data for November, ² for year to date.

The four weeks ending 24th November were slightly warmer than usual, due almost entirely to higher night temperatures; the rainfall was quite unusual, the excess almost reaching 43 per cent. of the total expected; the hours of bright sunshine were very few; the variability of temperature slightly above the average. To date the year has been cold, wet, and sunless.

Despite the absence of sun and the large rainfall, November shows a very considerable decrease in the total death-rate. Constitutional, respiratory, nervous, and phthisical cases participate in this decrease. Circulatory, digestive, and pneumonia deaths yield some increase. As in so many instances lately, although the number of total respiratory deaths is diminished, that for pneumonia is increased. Influenza was registered as causing five deaths.

For the eleven months of 1900 the accumulated total mortality for the first time has fallen below the average, although the numbers of deaths from constitutional, circulatory, digestive, urinary, pneumonic, phthisical, and cancerous diseases are all over those expected. Deaths from respiratory disorders alone being markedly below the normal; those from nervous diseases slightly.

Thus November, rather warmer than usual, because of clouded skies at night, very wet and sunless, with an increased variability of temperature from day to day, was accompanied by a lessened total mortality, and a decrease in the number of deaths from different causes, except circulatory, digestive, and pneumonia.

EDINBURGH MEDICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

ON BAD POSITIONS OF PELVIS PRODUCTIVE OF SPINAL CURVATURE.

By RICHARD BARWELL, F.R.C.S., *Consulting Surgeon, Charing
Cross Hospital, London.*

SOME thirty years ago, when my attention became more particularly directed to lateral curvature of the spine, I observed that a certain number of such cases originated in some condition of the lower limbs, producing inequality of length, therefore undue elevation of one innominate bone. This causation, which I believe I was the first to point out, I named obliquity of the pelvis. Some time afterwards, a series of cases excited in my mind a suspicion that there were other postures of the pelvis resulting in spinal curvature; but until comparatively recently they eluded my powers of verification. In 1889 the invention of my instrument¹ for measuring both the lateral deviation and the rotation of the scoliotic column in different regions, furnished me in the following manner with the key to the enigma. The mechanism was devised on the then universally received assumption, that save for the above-mentioned obliquity the pelvis was in cases of lateral curvature normally placed, that is, lay in the median line of the erect figure, and with its two lateral halves fairly in the transverse plane—in other words, neither side further back than the other. But in arranging this instrument to the patient's figure, I found that in at least a large percentage of cases that assumed correctness of position did not hold good; but that, on the contrary, the pelvis often stood to one side of my vertical indicator; or that quite as frequently one lateral half lay considerably in front of the other, and except by manual

¹ "On Certain Cases of Lateral Curvature and on an Instrument for the Accurate Measurement of the Different Deviations comprised under that Name," *Trans. Clin. Soc. London*, vol. xxii. p. 314 *et seq.*

pressure could not be brought to place itself fairly against the fixed straight edge representing that transverse plane of the figure, and from whence measurements were taken. These positions, singly or combined, occurred and recurred so often in my practice, that though at first quite inclined to regard them as occasional factors, I, after a time, suspected them of being constant, or nearly so, and ultimately became convinced that they, not mere accompaniments, are by far the most common cause of lateral curvatures.

The problem involved by this conclusion was such as to force upon me very great caution, and it is hoped that, if the manner of stating it here seem somewhat bald and abrupt, desire for clearness and brevity may plead excuse. That problem was simply this: Can it be possible that in all the years, ay centuries, during which lateral curvature has been studied, its true and most common cause has been overlooked, and the efforts of surgeons misdirected, by applying measures exclusively to parts above the sacrum, while leaving unrecognised and uncared for the *fons et origo mali*, namely, the sway or twist of that bone and of its neighbours? Though the last thirty years of this century have revealed many similar shortcomings of past times, this seemed, though unlikely, not at all impossible. Still, continuous experience and study led onward to the same result; a negative, however, being proverbially difficult of proof, I will not affirm that no spine, standing on a straight pelvis, is ever affected with lateral deviation and rotation, yet it may be written with certainty that since I detected the two malpostures above indicated, I have seen no case of scoliosis in which, either while sitting, standing, or both, the pelvis was normally and properly placed. In thus concluding, mere impressions made upon the eye have not been trusted: in some, measurement of the figure by a plumb-line and angles has been employed; in by far the larger number absolutely reliable photographs have been taken, and examined by rule and compass. This last phrase will be more fully explained in the sequel.

The pelvic malpostures with which we have to do are three in number: obliquity, amesiality, and version.¹

PELVIC OBLIQUITY means that one side of the pelvis lies on a higher level than the other. It is, unlike the other two, not dependent on a trick or habit, but on a difference in length of the lower limbs, whether produced by some past, perhaps even transient disturbance, such as hip disease, some injury to an epiphyseal junction, or merely to an inequality of growth without

¹ In point of fact, there are two other abnormalities of posture; but since they, as far as my experience goes, do not produce lateral curvature, it seems undesirable to mention them in the text; they are too great vertically, and have too great slope forward, the former resulting in loss, the other in exaggeration of the normal forward bend of the lumbar spine.

assignable cause. This condition having been sufficiently described by me elsewhere,¹ merely diagnostic methods need here be adverted to. The patient, having the garments let down to a level with the hips, standing with feet together and knees straight (drill posture), is so arranged that in front some straight horizontal line in the decoration or furniture of the room may serve as the gauge of level. The surgeon, behind the patient, places the index finger of each hand on the *cristæ ilii* at the side outline, and gets his eye at such a level that one of his fingers corresponds with the horizontal; unless the other also do so the pelvis is oblique. This of course means that the sacrum—the lower part of the spinal column—slopes from below upward and to the lower side.

AMESIALITY OF THE PELVIS is a term indicating that the patient in standing erect habitually places the pelvis to one side of what should be the central mesial line of his figure. It may be diagnosed, but not very surely, by making him stand in drill posture, the heels close together, unless that produce a sideway swaying of the figure, in that case they may be allowed to stand a little apart, but at exactly equal distances from a carpet pin or other mark on the floor. Placing himself absolutely square behind, the surgeon so holds a plummet that it or its cord cuts that mark. If, traced by eye upward, it do not fall over the intergluteal fissure, the pelvis is (probably) amesial. In order to carry out this method, the patient's back, hips, etc., must of course be bare, the feet also must be easily visible. The word "probably" is bracketed above, because it is difficult to secure steadiness of all three factors—surgeon's eye, plumb-line, and patient. The camera affords a much more certain mode, since the image can be accurately triangulated and measured. For this it is essential that besides good lighting, the room should be otherwise conveniently arranged, because a view unobstructed or nearly so by clothing must be obtained. If it be thought desirable, some garment may be kept on from mid-thigh to mid-leg—the stockings, if retained, must be either white or at all events sufficiently light in hue to tell upon the plate. For my own practice I show the patient how to stand with regard to window, camera, and certain arrangements, now to be described, and retire until garments have been removed and the proper position taken up; then, on being called, entering at a second door behind the patient's back. I never go in front. The few necessary seconds being passed, I retire again until sufficient clothing has been resumed. This method is unobjectionable, at least is not objected to. The certain arrangements above mentioned concern a device for making sure that the photograph is taken from directly behind the patient; one taken otherwise than at a right angle to the transverse plane of the figure may easily mislead. To insure correctness, a piece of white tape

¹ Barwell, "On the Causes and Treatment of Lateral Curvature."

about 5 ft. long is fastened at each end to the floor by carpet pins, which also secure the ends of a much longer piece of string,¹ which bears a knot in the exact centre. The mid-point of the tape is marked by a carpet pin or by other conspicuous sign. If then the centre of the lens coincide with this knot in the string, the image fall on the centre of the ground glass, and the patient stand at the mid-mark of the tape, the camera will be at the apex of an



FIG. 1.—Pelvis amesial to left (—), right knee a little more valgous than left.

isosceles triangle, the object at the end of an imaginary bisecting line drawn from that apex to base. The picture, therefore, must be taken at an exact right angle to the plane of the figure—that is to say, if that plane be normal, not twisted to one side or the other.

Fig. 1 is reproduced from a photograph thus taken; the white tape by the heels with the centre mark is the basis of measurement, carried out by placing a straight edge, a steel ruler for instance, accurately against this line,² and on its margin a square, taking care that its angle correspond with the mid-mark on the tape. If the other limb of the square fall upon the intergluteal fold, the pelvis is mesial; but should it, as in the above figure, fall on one side, it is amesial. The reader, remembering that the camera image is very much smaller than the subject, will not be misled by the apparent minuteness of the deviation, the amount of which may be expressed by a mathematical formula, thus: The patient's figure from occipital tuberosity to heels may be taken as 5 ft. 4 in.,³ the image as 4 in., the distance from the true perpendicular to the intergluteal fold as $\frac{3}{16}$ in.—

$$4 : 64 :: \frac{3}{16} : x \therefore x = 3$$

the figure from feet to hips is 3 in. out of the perpendicular. Scarcely is it necessary to point out

¹ The length depends on the lens and camera: if, on a quarter plate ($4\frac{1}{4} \times 3\frac{1}{4}$), one wishes the image to be about 4 in. long, the distance with a usual portrait lens will be about 7 ft., the string about 15 ft. long.

² Being quite at the edge of the picture, a certain amount of spherical aberration causes this line to be slightly curved, the outer coinciding with each end gives far truer result than placing the square itself against the line.

³ She really was taller, which would decrease our result; but for simplicity's sake in the avoidance of fractions that height may be accepted.

that a column built up of a number of separate superposed pieces cannot possibly stand straight on a basis thus misplaced and lying out of the line of gravity.

VERSION OF THE PELVIS is a fault of posture concerning the existence of which it may be a little difficult to convince the reader, since I myself was for some time sceptical as to its reality, although, as subsequent study of a great many cases has shown me, it is very frequent. Probably the simplest way of gaining credence will be to direct attention to the annexed figure. Let it be noted that the distance from the rima natium (which of course should be central) to the pelvic side outline of the right side is very small in comparison to that on the left. On the right the post-trochanteric fossa is foreshortened, being represented by a mere narrow shadow; on the left, that depression is seen much more broadly; its hither margin is pictured by a wide shadow, its further one by a high light. The pelvis presents on the left almost a side view, and one sees the projection of the trochanter.¹

These remarks almost give the diagnosis of version if a camera be used; but only a few cases are as strongly marked as this, otherwise the condition could hardly have escaped notice until the time when I first pointed it out. If the camera be used, we also must call in the aid of compasses, and must measure from the central mark (intergluteal fissure), to right and left side outlines. Fig. 3 represents a far less evident degree of version, yet one which, with the aid of such measurement, cannot be mistaken, for it bears the same characteristic, greater breadth of one side of the pelvis, and the same wider view of the post-trochanteric fossa. It may be permissible to remark here that the exact position of camera secured by isosceles triangle, as above described, is all-important; very slight false placement, bringing one side of the pelvis more than the other into view, causes it to look broader.

But all practitioners may not have the means and con-



FIG. 2.—Extreme left version.

¹ This accounts for the appearance of a slope of the left limb from hip to heel; the pelvis is, it is true, also a little amesial, but not enough to produce that oblique look, which, be it noted, is absent from the right limb.

veniences for using photography, and this particular malposition is, without it, much more easily diagnosed than is amesiality. Let a piece of white tape be pinned to the floor, and the patient arranged so that the heels touch its edge. Of course, garments must be dropped to a little below the level of the trochanters, those that are retained being so drawn forward as not to intercept the view. The surgeon then holds some straight rod or sufficiently narrow slip of wood about 2 or 3 ft. long horizontally, and places its edge in equable contact against the patient's glutei, then stooping his head so that with the right eye he can look along the spine from between the scapulæ downward. In this position he notes whether his rod lies parallel to the tape, or cuts it at an angle somewhere between the heels; one end lying behind, the other in front of the white line, in which case the pelvis is verted towards the side on which the rod is posterior.



FIG. 3.—Moderate right version.

But version is maintained in other than the erect posture: for instance, it is also present while sitting,¹ and here too the diagnosis is easy. A long ruler as above specified may be held parallel to the seat of the chair against the glutei, and the presence or absence of obliquity noted, for this undressing is not necessary; though, lest variations of thickness deceive, the skirts should be removed or turned down. A surer way is to take the knees as indices. Behind the patient (in drill posture) a chair is placed; she is told on no account to look round, but to sit straight down and keep the feet still; the knee-joints therefore will be bent at a right angle, and in

well-marked cases the one will be felt or seen to lie considerably in front of the other; or, and this should always be done, when by the unassisted eye inequality cannot be distinctly verified, a straight-edge placed on the upper part of the patella ligaments will by its obliquity indicate the forward position of one knee, signifying, of course, that one acetabulum, *i.e.* one side of the pelvis is in front of the other. I have called the direction of

¹ We shall see immediately that the fault is probably acquired in this latter position.

version, right or left, according to the side that lies farthest back.

Of these three faulty postures the first described one (obliquity) very often occurs alone, the other two seldom; occasionally all three coincide in the same person, a condition or rather a congeries of conditions which always gives rise to rapid and severe deformity. The annexed figure is an example of this, as the reader's eye will at once inform him by noticing on the right the lower position of the fold of the nates, while on the left the crista ilii lies close under the backward projected ribs, where the deepest shadow in the whole picture is visible; the reason of its being so slightly prominent is that the version having thrown it forward buries it, as it were, among the lower false ribs.

The other two malpostures generally concur, one being usually more marked than the other; the two may both be to the same or to the contrary side; in either case it must not be assumed that the one defect annuls or counter-balances the other; it supplies rather an additional causation modifying as to place and form the resultant curvature. Scoliosis has too much been described as an almost homogeneous malformity; but it in fact varies in different cases very much; in some the lower or lumbar curve continues throughout the column (total, simple curve); in others a very high dorsal curve in the contrary direction is found. In others again it is the lower curve that is short (occupies but few vertebræ), while the upper curve is long. In another series of cases the proportion between lateral deviation and rotation differs immensely, hence much variety in form. My investigations are, however, not yet complete enough to warrant relegation of such varieties, each to its kind or combination of pelvic false postures; to do this involves more time for prolonged study than has as yet been accorded me.

Some few words must, however, be said concerning the circumstances which cause these pelvic malpostures. According to my observations, they do not originate in erect but in sedentary postures. The studies of young people are in these modern times



FIG. 4.—Obliquity right version and amesiality.

much more prolonged than was the case some years ago, and writing occupies a large proportion of the time. If a youth of either sex with or suspected of incipient curvature be told to sit down and write a few lines to rapid dictation, he or she will hardly ever be found to sit square and straight. The usual trick is to throw the right half of the pelvis back, as may be detected by placing a straight edge across that part;¹ the next commonest is to sit almost exclusively on the left tuber ischii; one can often pass the flat hand quite easily between the right one and the seat of the chair. Some young folks reverse this, *i.e.* what has been just said of the left must be transferred to the right, and *vice versâ*. Many schools, high and other, are provided with special desks; these only partially effect the object of securing a good position; they counteract to a certain degree the tendency to sit only on right or left side; they are all but inoperative against the lateral twist. Also the students at day schools are generally given home tasks involving much writing, which perhaps even more than that at the institution may be done in faulty position. A habit thus inaugurated in sitting, very easily extends also into the standing posture, and although such juveniles as delight in athletic amusements may obviate the evil effects, yet many even of these suffer, while the more physically inert are certain to do so. If these awkward tricks coincide with quick bodily growth, their evil influence is naturally rapid, so much so that the term "acute scoliosis" would not be inapplicable to some of these cases.

The object of these pages is, as will have been gathered, very much prophylactic. A child detected by the means described sitting or standing askew should be intelligently corrected. Lateral curvature may be thus forestalled, or if incipient redressed. A great deal of this task must necessarily be in the hands of parents or others in charge; the family medical attendant, however, having learned these pelvic malpostures and their result, should from time to time see that his directions as to correctives are obeyed and are having their effect. A photogram may often enable him to explain the faults, which otherwise he may find cannot by a non-anatomist be understood. Curves somewhat more developed require surgical treatment at intervals, corresponding to the severity of the case; but to render even that successful, the pelvic malposition—the cause of the evil—must be corrected. Professional attention can, however, occupy but a small portion of the patient's time, say an hour or so in the month. One who is careless, apathetic, or recalcitrant has the other seven hundred and seventeen hours in which by such behaviour to counteract all, even the most skilled efforts; while by avoidance of the evil habits, which will have been pointed out, great assistance will be furnished towards obtaining complete rectification of the deformity.

¹ The knees cannot readily be tested, as they are under the table.

THE BORDERLAND.¹

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LECTURE II.

AT the conclusion of my former lecture, I pointed out that the prevalence of special forms of excitement might be regarded as quite sufficient to upset the sanity of certain individuals, while in others a similar excitement might only be the means of directing action quite apart from the mental condition of the individual so influenced. But mental excitement has much more to answer for than the mere causation of sporadic cases of insanity, as both in ancient and in modern times there have been periods when mental excitement of varying character has given rise to widespread epidemics of divers natures, not always regarded as insane in their essence, though indubitably possessing many of those qualities which characterise insanity, and which appear to have escaped due recognition as such only, because the manifestations have happened to coincide with the spirit of the age. The Middle Ages, so called, have been the period when epidemic insanities have chiefly prevailed, but quite down to our own day there have been constantly recurring waves of thought which have affected mankind epidemically, the insanity of which has been overlooked, because these thought-waves have happened to accord with the prevalent ideas of the day, and is only to be recognised when they are observed from a somewhat different point of view, or are criticised by the spirit of another age than that in which they originated. Take the Crusades, for instance—Holy Wars, wars waged under the banner of the Cross for the delivery of the Holy Land and of its Holy Places from the dominion of the Paynim host, and which gave rise to many noble deeds of arms, and led to many displays of chivalry on both sides. But think how they originated, and to what atrocities they led, and say if they do not more resemble successive waves of insanity—religious insanity if you will, for many foul deeds have been consummated under the cloak of religion—than a holy war, as if a war could ever be holy however unavoidable it may be.

Within a hundred years after the death of Mohammed, his followers had made themselves masters of Arabia, Syria, Persia, Egypt, and the north of Africa, as far west as Spain. Islam ruled supreme over the Holy Land and the Holy Places. The Arabs who conquered Palestine in the seventh century respected the religious feelings of the pilgrims, who for generations had been accustomed

¹ The Morison Lectures for 1900. Delivered at the Royal College of Physicians of Edinburgh, December 11, 1900.

to resort to the Holy Sepulchre, and to visit the various scenes in the Holy Land dear to the Christian heart; but in later years succeeding generations of Turks, both more ignorant and less tolerant, had robbed and murdered the Christian pilgrims, and nothing but their lust of gold prevented them from destroying the Holy Places, and removing every trace of Christianity from the land. Kings and Popes in vain endeavoured to rouse the nations of Europe to a sense of their duty to their fellow-Christians; a Holy War, a Crusade was suggested, but the suggestion was unheeded. At last there arose a fanatic, a French officer, with the soubriquet of Peter the Hermit, a dwarf, emaciated by the hardships he had undergone and by his fastings. He had made the pilgrimage to the Holy Land, had been subjected to all the atrocities exercised upon his fellow-pilgrims, and, in burning words, he poured into the listening ears of Europe the story of the horrible cruelties to which the pilgrims were exposed, and made the nations at last realise that the places most dear to the Christian heart were trampled underfoot by a set of ruffians who would listen to no reason, and who could only be overcome by force. Pope Urban II. saw his opportunity and seized it. He made a great speech at Clermont in France, in which he described a Crusade as an errand of mercy and love. He called upon those who heard him to put out of sight the ties that bound them to the places called home—"They are not," he said, "they do not exist; the Christian in this world is always in exile, yet all the world is his country. If you leave a rich patrimony here, you will find a better in the Holy Land. Those who die will go straight to the mansions in heaven, the living shall pay their vows at the Sepulchre of the Lord. Blessed are they who, taking this vow upon them, shall obtain such a recompense. Happy are those who, led to such a conflict, shall obtain so great a reward." "It is the will of God," cried the people; the Pope took up the word—"It is indeed the will of God, and let these words be your battle-cry when you find yourselves in the presence of the enemy. You are soldiers of the Cross; wear then on your heart or on your shoulders the blood-red sign of Him who died for your salvation." Between them, Peter and the Pope raised such a wave of religious enthusiasm, that it is alleged that 6,000,000 followed Peter the Hermit to the Holy Land—not an army, though there were many armed men amongst them under well-known leaders whose names are famous in story, but mainly a huge crowd of men, women, and children, religious maniacs, led by the poor fanatic Peter the Hermit, who was one of the first to flee when serious opposition was met with, and was several miles on his way home before he was caught and brought back to be reprimanded by Tancred before the walls of Antioch. In spite of its unpromising constituents, the First Crusade was successful, and for fifty years Jerusalem remained in the hands of the Christians. Then came

a recrudescence on the part of the Turks, and the preaching of a Second Crusade by St. Bernard, Abbot of Clairvaux in Champagne, resulting in the march eastward of over 1,000,000 of armed men, under Louis VII., king of France, and Conrad III., emperor of Germany. After a vain attempt to capture Damascus, the relics of this mighty host returned to Europe. The Second Crusade was a miserable failure, and St. Bernard, overwhelmed by the catastrophe, proclaimed that the failure was due to the sinfulness of the pilgrim host, and that none but innocent hands could accomplish the conquest of the Holy Land—an idea which ultimately resulted in the most tragic calamity of the age—the Children's Crusades. At sundry times swarms of children, wholly unfit and quite unprepared for the task set before them, were sent eastward to accomplish with their innocent and unarmed hands what their armed fathers had failed to do. At one time, 30,000 children under a leader named Stephen, and again 20,000 under a peasant lad named Nicolas, set out for the Holy Land, and these hosts of innocent children ultimately disappeared in the graves and the slave markets of eastern Europe. After these there were many other Crusades. The feelings roused at the time of the First Crusade smouldered for centuries with occasional outbursts—but the Turk still holds the Holy Land.

Kings and Popes in vain endeavoured to rouse the nations to take an interest in the oppressed and cruelly treated pilgrims, but all their appeals fell upon deaf ears, till the fanatic Peter the Hermit succeeded in rousing Europe, and then the nations sent not an army but a horde of men, women, and children. No doubt there were some wise and noble men amongst them, and many well-armed troops who did what they could to free the Holy Places, and establish order in the Holy Land. But these did not make the Crusade, they only took advantage of it. The Crusades were set agoing by that wave of religious mania started by Peter the Hermit, which may be said to have culminated in the most insane, most pathetic, and most awful of tragedies, the Children's Crusades.

Sporadic insanity, we have already seen, has made the world its debtor in many directions, and the wave of religious mania known as the Crusades has also had a most important influence on the world's history and progress. It led to the breaking up of the feudal system and the abolition of serfdom, and to the assertion of the supremacy of common law over the independent jurisdiction of individual chieftains. It gave to maritime commerce the earliest and the most important impulse it ever received, and through this, towns which were the early homes of liberty, began to grow great and powerful. The intimate connection it brought about between the great leaders of men and the Church led to a closer scrutiny of the Papal policy and motives which were not conducive to the maintenance of that spirit of reverence and

trust upon which the prosperity of the Papal Church depended, and it gave rise to a freedom of judgment and opinion to which Europe had hitherto been a stranger, and which paved the way for the great Reformation introduced by Luther. The Turk still rules the Holy Land, and we must ever deplore the unavailing waste of human life, but otherwise the nations of Europe, nay the kingdoms of the world, owe many invaluable, temporal, and spiritual benefits to the wave of religious mania started by the burning words of the emaciated fanatic, Peter the Hermit.

Hecker made a most remarkable statement when he said that "it appeared worth while to describe diseases which are propagated on the beams of light—on the wings of thought; which convulse the mind by the excitement of the senses, and wonderfully affect the nerves, the media of its will and of its feelings." By and by we shall learn something of diseases—propagated and produced by beams of light, now we have a few words to say as to those remarkable diseases which affect the nerves through the medium of mental excitement, diseases ever with us, though more prominent at one time than at another. In past ages, and down even to the present day, there have been many epidemics of insanity of an everchanging type; some of these epidemics have been of long duration, and others have been more evanescent, but, so far as it appears, not one of these—since the Crusades—has been productive of the slightest benefit to mankind, except as a warning against the excitement of emotions liable to become uncontrollable, and which may lead to demoralising and debasing results. Even when some advantage has seemed to be gained, it has always been obtained at a risk quite disproportionate to the benefit received.

Perhaps the earliest of these epidemic insanities was the Choreomania or pandemic dancing mania which overspread all Europe from the end of the fourteenth century for over two hundred years, of which sporadic examples have been known to occur even in our own country so late as the early part of this century. For quite three hundred years before the advent of the great pandemic dancing mania, sporadic attacks of a similar character, implicating many hundreds at sundry times and places, have been recorded. Indeed, there is little doubt that such seizures occurred at a much earlier date. We learn that the prophets of Baal before Ahab and Elijah—nearly a thousand years before Christ—leaped and cut themselves, and howled after the manner of these maniacs. Moreover, these outbreaks have generally been connected with the worship of Baal, with the purifying fires lighted in some parts on May day, but more generally at midsummer, and when Midsummer Day became dedicated to St. John, the Beltane fires were still lighted, and similar unholy practices were still carried out, hence the first great outbreak of this dancing mania got the name of St. John's dance. Indeed, when the crowd of dancing maniacs first appeared

at Aix-la-Chapelle in the midst of their delirious shoutings, the name of St. John was bandied from mouth to mouth, and it seems almost certain that the wild revels of St. John's Day, 1374, was the prime cause of the mental aberration, and the repulsive bodily distortions which subsequently affected so many thousands. The name of St. Vitus, which still is used to designate those milder forms of purely muscular insanity—*folie musculaire*—we still have amongst us, was applied to the Chorea magna Germanorum for a totally different reason. St. Vitus was a Sicilian martyr with no particular history, nor any special sanctity, though this he subsequently acquired by repeated removals from one burial place to another, and it then became convenient and useful to accept him as a faith-healer. A legend was invented which described him as praying—just before he bent his head to the sword—that he might be a succourer and helper of all who suffered from the dancing plague who should solemnise his commemoration day and fast upon its eve, thereupon a voice from heaven was heard to say, "Vitus, thy prayer is accepted." Thus St. Vitus became the patron saint of choreomaniacs, just as St. Anthony is of those who suffer from erysipelas, and St. Martin of Tours of those afflicted with variola. It is quite likely that the solemn procession to the altar, the worship in which they engaged, and the sanctity of the shrine, did promote a cure in many; it seems certain, at all events, that no attacks ever originated at the shrine of St. Vitus, and in this it was a marked contrast to that of St. John. The fires of St. John, like those of Baal of old, were supposed to protect all that passed through them from all diseases, and especially from all fevers for a whole year, and it seems probable that the festival of St. John, 1374, simply brought to a crisis a malady which had been long impending, because it happened to be celebrated with unusual fervour.

The ravages of the plague had scarcely ceased, the whole of Europe was covered with the scattered graves of millions of its victims, throughout the whole of west Germany, especially in the proximity of the Rhine and the Maine, which had suffered from severe floods, the populace were ill fed, wretched, and miserable. In this enfeebled condition mental excitement was only too readily roused, exaggerating the wild Bacchantic leaps and bounds with which they sought to honour Baal or St. John—for the worship was a relic of the past, and the ignorant people were not likely to discriminate on whom it was bestowed, while the unusual exertion gave rise in their ill-fed bodies to flatulent distention of the bowels and excruciating pains, followed by fearful screams, and causing them to foam with impotent fury, all of which combined to produce as weird and hideous a scene as could well be imagined. It seems probable that the origin of the Beltane fires, Baal fires, Bon- or Bonfires was simply the purification of the old time villages by burning all the bones and refuse about them—a sort

of effective spring cleaning. Baal was the sun-god and mid-summer day was his commemoration day, because the sun was then at the height of his splendour. The wild revels of his worship probably arose from the idea that as villages were cleansed by fire, so human beings would also be purified by passing through the flames, and to this in time human sacrifices were added, still further to propitiate the deity. Persons of all ages danced wildly round the fires, jumped through them, lighted torches, and rushed wildly with them round the fields to invoke the blessing of the sun-god upon them. June 24th was the nativity of John the Baptist, so when the world became nominally Christian the name only was changed, and the wild revels of Baal worship were continued under the name of St. John. After the outbreak in 1374, thousands of these insane dancers spread themselves over Europe during 200 years; they screamed, yelled, and foamed at the mouth; insensible to all external impressions, they were haunted by visions of saints and demons, and saw the heavens opened with the Virgin Mary and her Divine Son seated together on a throne—all the religious notions of the age being variously reflected in their perturbed imaginations.

A form of this mania called "tarantism" and ascribed to the bite of the tarantula, prevailed in Italy. Under another name it spread to Abyssinia; in England and in America the Methodist sect called the "Jumpers" was a mere variety of this choreomania; and even in Scotland, isolated examples of the "louping ague" continued to be observed down even to the beginning of the present century. In Germany, after the lapse of two centuries, this choreomania was gradually dying out, and it finally disappeared amid the purifying fires of the Thirty Years' War, which commenced about 1618.

This may be said to have been the last, as it undoubtedly was the greatest, of those epidemic insanities which troubled the people of this world all through the dark ages of ignorance and superstition, and which still lingered on in forms more local in their origin and more sporadic in their character, such as the Lycanthropes of the 17th century or the Convulsionaries of the 18th, or that still more localised attack affecting some of the more northern parts of Shetland, and which, after lasting for about 100 years, seems to have been checked if not entirely cured by the church officer throwing one of his most troublesome patients into the water.

Choreomanias have long since ceased to exist, but other forms of epidemic insanity have not yet disappeared, though their character has altered with the changes that have come over the spirit of each succeeding age. The spread of intelligence and the progress of learning have softened the coarse vulgarities of older epidemics, and have added new and more refined subtleties to each successive development.

In olden times, fools and lunatics were thought to be under the special care of the heavenly powers, and were believed to be able to advise and guide mankind by the vague and ambiguous utterances that dropped from their fatuous lips. We no longer give expression to our own ideas of what exists in another world or is pleasing to its denizens by enigmatical utterances like the Pythia of Delphi, or by the uncouth antics and wild howlings of a maniacal mob, but we still seek to know the unknowable, to communicate with our departed friends, and to learn what goes on beyond the gates of death, and we show our insanity by the methods we pursue, and by the reasonings which many of us adopt. Table turning, hypnotism, thought-reading, and spiritualism, such are the names of several forms of epidemic insanity which have prevailed among us during the last fifty years, and of these table-turning in its day was perhaps the most universal, hypnotism the most dangerous, and spiritualism the most alluring.

Rather more than fifty years ago you could scarcely enter a house, especially of an evening, without finding some votaries engaged in the then fascinating pursuit of table-turning, at which you were sure to be asked to assist. The experimenters were generally satisfied that their tables were possessed of hitherto unsuspected powers of motion, and sometimes they were absolutely aghast at the variety and nature of the knowledge which these tables possessed. We were very unsophisticated in those days, and when a hitherto quiet and seemingly innocent table upon which our hands rested began to move round with ever-increasing speed, we were apt—some of us—to get alarmed, and it was felt to be quite beyond a joke when this seemingly mindless piece of wood displayed a knowledge far beyond that of any of its manipulators. If asked as to the existence of heaven or hell, or whether the spirit in the table was acquainted with Satan himself, the replies were always unhesitating and emphatic, nor did they excite much disquiet unless they happened to run counter to the belief of some timid souled interrogator. But it was quite another story when the table spirit, by judicious cross-examination, began to reveal sublunary secrets; then, indeed, alarm was excited, and one table which had injudiciously blurted out the age of its spinster possessor was promptly sent elsewhere to tell its tales to less sensitive ears. Table-turning was a madness, and for long a very universal one; it was very harmless, however, except to those who could not divest themselves of the idea that tables could be possessed by spirits from the other world, who did reveal secrets. Let us hope that such simple-minded creatures were but few. But few or many, the delusion was not dissipated until Faraday showed by a most ingenious piece of mechanism that the movements of the tables, and even the knocks they gave, and by which they were supposed to answer questions—by means of a pre-arranged code—were all due to the more or less unconscious

muscular movements of the manipulators. Under this simple physical explanation table-turning and table-talking simply died away. So long as it lasted, this peculiar insanity had a powerful influence upon a certain class of minds, and gave rise to quite a literature of its own, which was amusing enough at the time, though of no value at the present day—nor indeed at any other. In those days there were some who believed that both table-turning and table-talking were manifestations of Satanic agency, who put what they called test questions, and who got just the answers they expected. In its day it was a very remarkable form of epidemic insanity, now it is only useful to “point a moral, and adorn a tale.”

So long as we divest ourselves of any idea of the possibility of any ultra-physical occurrence, or of anything happening in this world which is supernatural and yet cognoscible by our senses, there are many investigations which are alike interesting, amusing, and legitimate, but which become insanity and lead to mischief when regarded from any other point of view—and one of these is thought-reading. In itself it is a harmless and even a beneficial amusement, as it leads to the development of an acuteness of intellect and a sensitiveness of touch and hearing which is sometimes truly marvellous, but carried beyond this, and regarded as an actual fact, it leads to ideas of thought, transference, and telepathy, which would make life unendurable. It is true that occasionally the most marvellous things do happen, but these are either remarkable coincidences or extraordinary dreams which we accept as facts without attempting to get behind them or beyond them, because “that way madness lies.”

The late Dr. Abercrombie, in his work “On the Intellectual Powers,” narrates many curious and remarkable histories, of which I shall quote one, first, because it looks like a most circumstantial case of telepathy, and second, because it was a most remarkable coincidence absolutely devoid of meaning or result. “A young man, who was at an academy a hundred miles from home, dreamt that he went to his father’s house in the night, tried the front door, but found it locked; got in by a back door, and, finding nobody out of bed, went directly to the bedroom of his parents. He then said to his mother, whom he found awake, ‘Mother, I am going a long journey, and am come to bid you good-bye.’ On this she answered, under much agitation, ‘Oh, dear son, thou art dead!’ He instantly awoke, and thought no more of his dream, until, a few days afterwards, a letter from his father arrived, inquiring very anxiously after his health, in consequence of a frightful dream his mother had on the same night in which the dream now mentioned occurred to him. She dreamt that she heard some one attempt to open the front door, then go to the back door, and at last come into her bedroom. She then saw it was her son, who came to the side of her bed, and said, ‘Mother,

I am going a long journey, and am come to bid you good-bye;' on which she exclaimed, 'Oh, dear son, thou art dead!' But nothing unusual happened to any of the parties."

Again, a lady, a patient of Dr. Abercrombie's, with whom I myself was well acquainted, lay apparently at the point of death, her husband sitting at her bedside watching what he believed to be his wife's last moments, when she suddenly revived, and said to him, "I have come back to you, I am to be spared to you for a few years." "A few hours, my dear," was her husband's reply. And to this came the immediate rejoinder, "No, a few years." This lady did recover, and lived for sixteen years. When she got stronger, she explained that she thought she had died and had appeared before the throne on high, when she was told to return to earth, that her time had not yet come, and that she was to remain with her husband for some years. Dr. Abercrombie was intensely interested in this vision or dream, for which he had no explanation. The husband of this lady was his own early and lifelong friend, and he had known them both all their married life.

I have quoted these two cases as authentic and remarkable instances of the many inexplicable facts that are continually taking place around us. We must accept them as facts, but we cannot explain them, and whenever we attempt to get behind them or beyond them, then we overstep the bounds of reason, we cross into the Borderland, or we may even get beyond that. As Sir Philip Sidney has said, "Reason cannot show itself more reasonable than by leaving reasoning on things above reason."

About twenty years ago there was quite a mania for thought-reading, and there were many adepts of greater or less calibre who pandered to the desire of the public—for you remember the old apophthegm, *Populus vult decipi et decipiatur*—as well as feathered their own nests comfortably. One of these adepts was clever enough to secure a letter of commendation from the late Dr. Carpenter, who was deservedly regarded as the opponent of all humbug. Carpenter believed he was doing a service to humanity by recommending this thought-reader to the credulous as an honest exponent of the methods he pursued. Unfortunately, Dr. Carpenter's commendation had the effect of conferring a wide and undeserved celebrity upon the performer, as well as a fictitious degree of importance upon the powers which he did exhibit. It served also as an introduction to scientists, and brought a number of distinguished men into the unenviable position of acting the stalking horse to the performer's notoriety. Another well-known thought-reader was clever enough to mingle an exposition of the tricks of so-called spiritualists with the display of his own peculiar powers. In this way he attracted the attention of those who believed he was doing good work, and secured the support of many distinguished men who ought to have known better, and of whose support the performer knew very well how to make the

most profitable use. One of those thought-readers, when performing before the Marquess of Lorne in Canada, was asked to try what the marquess said would be a "more difficult experiment than any you have just accomplished. You cannot possibly know anything about it, and if you succeed it will certainly be the most extraordinary thing I have yet witnessed." After being blindfolded, and having the marquess' hand applied to his forehead, the performer and the marquess careered madly through room after room in Rideau Hall until they reached the stable, when the performer rushed to a stall, and, placing his hand upon the head of a pet moose belonging to the Princess Louise, exclaimed, "This is the thing; why, it's alive!" In this exclamation the thought-reader gave himself entirely away, for if he had been able to read the thoughts of the marquess, he would have known that the marquess wished him to find the princess's pet deer, and he would not have been astonished to find it alive. So little did this thought-reader understand the importance of the admission he made, that he actually made use of this tale as an advertisement under the sensational title of "Hunting the Moose." This simple admission completely disproved any claim he made to actually reading the thoughts of men; and yet, with this advertisement scattered broadcast through the city, I have seen this same man with unblushing effrontery doing his best to humbug hundreds, and have seen scores of reverend seigniors scampering after him to look for a pin in Princes Street gardens. Verily, for the time, thought-reading was an epidemic mania. And yet it was no new thing, it was only a modern manifestation of an old idea, for in earlier times there were many modes of reading thoughts for the amusement of our friends. It was reserved for these latter days to make it a profession for the benefit of unprincipled adventurers. So-called thought-reading is, as you may well suppose, no direct communication between brain and brain, it is merely a little game between two individuals, one of whom has a thought which the other is bent on finding out; but as the one with the thought will not verbally expound it, what can the other do? Fortunately for us, our thoughts cannot be read, so all that the inquirer can do is to hit upon the thing thought of; this, naturally, limits materially the scope of the inquiry, and simplifies the matter very much. This was what was done in the case of the pet moose, and no one seems to have been more astonished than the would-be thought-reader, who found the "thing," and to his amazement found it to be "alive." By unconscious movements of his hand upon the thought-reader's forehead the marquess guided him to the stable, and there he found the "thing."

It is truly remarkable how expert some people become by long experience; they will pick out one pin from a row stuck in a pincushion, or they will discover so small an object as a pea hidden anywhere, and to these discoveries they are led by the

unconscious muscular movements of him whom we may call the assistant—him whose thought is to be read. To make the discovery a success, the assistant must have his thoughts fully concentrated upon the subject to be discovered; if otherwise, the movements are sure to be made consciously, and then they are almost certain to be misleading. He must be ready to exclaim with a venerable medical man in the like case, that he “had not consciously made any unconscious movement.” Some thought-readers have been so very expert that they did not require actual contact, but were quite able to detect the locality and to be guided to it by alterations in the sound of the footfall of the assistant, due to unconscious muscular movement. It is a striking proof of how great a mania thought-reading was for a time, that it was worth while for any one to take the trouble to become so expert, that it had quite a literature of its own, and engaged the attention of so many scientists. And yet the whole key to the imposture lay in the exclamation, “Why, it’s alive!”

In the year 1851 a regular epidemic of mesmeric mania overspread all Edinburgh, affecting all classes and conditions of men, and subsequently travelled over the whole country, following the track of its peripatetic propagators. The extent to which this epidemic prevailed could scarcely be imagined; fashionable parties were made the scenes of experiments on the nervous functions; noblemen, members of all the learned professions, and quiet, respectable citizens were all alike entangled in the meshes of this widespread delusion. Even in educational establishments, girls and boys used to throw themselves into states of trance, and exhibit their staring eyeballs and rigid limbs for the amusement of their companions. In time this mania passed away, but not without leaving behind it many enfeebled minds and many debilitated bodies as evidence of the evil it had done.

About the middle of last century, Antony Mesmer invented what he called animal magnetism, which came to be called by his own name, Mesmerism; it has since been called electro-biology, from an idea that the state produced in animal bodies in some way resembled that induced by the action of a magnet or of electricity. The term Hypnotism was first applied to it by the late Mr. Braid of Manchester, who was one of the earliest and most scientific investigators of the peculiar phenomena included under these terms. Indeed, these remarkable phenomena excited very considerable interest, and some well-known scientists were so carried away by the idea that they must be the product of some hitherto unrecognised force, as to accept the views of Reichenbach, who gave to this force the name of “od,” using this term as a suffix; the prefix implying the agent employed, as *crystallod*, *biod*, or *electrod*, according as this influence was communicated by gazing into a crystal, by human agency, or by electricity. Braid

of Manchester seems to have been most careful and accurate in his experiments, but had no very recondite explanation to give. Others, such as Hughes Bennett, were more pretentious, if not more accurate, and sought to connect and explain the various phenomena by means of the structure and physiology of the brain as then understood. No doubt the premises were right enough, but it may be doubted if the conclusions drawn were in any way satisfactory, either to the lay or to the professional mind. The claims made by the professors of hypnotism were not less varied than they were extraordinary. The subjects of their art, they alleged, could read with the tips of their fingers, or with the pit of their stomachs, could see all a man's internal arrangements better than we can with the aid of the Röntgen rays, and could carry out all the other wonderful performances included in the term "clairvoyance"—a condition, by the way, first brought to our cognisance by the French convulsionaires in the beginning of last century, one of whom at least was said to read by her sense of smell, with her eyes blindfolded. The claims to clairvoyance were promptly extinguished, as not one was able to secure even one of the many £100 notes which lay at the demand of any who would read one or other of several lines from Shakespeare enclosed in a box. One young clairvoyant was collared at a public exhibition and compelled to tell what she saw within a box held up to her; she said she saw a coin, but on being opened, the box was found to contain nothing but a spoonful of millet seed. But hypnotism had marvels enough without clairvoyance, and, considering the many singular results obtained, it does seem somewhat remarkable that hypnotism has passed so completely out of the domain of medicine. The mere exercise of the will was sufficient to make a patient sleep for twelve, twenty-four, or thirty-six hours as desired, yet insomnia is as troublesome to treat as ever. A few passes over the colon were more efficacious than the most active aperient, yet Æsculap and Beecham's pills seem still to be much in demand. One lady had milk restored to one breast by a few passes over it; and when she complained that her figure was spoiled by this unilateral arrangement, she was again hypnotised, when a few passes over the other breast satisfied her by restoring her symmetry. Nay more, such an objectionable drug as an emetic could be made to act by merely holding the bottle in one hand, while its action could be at once arrested by placing an antidote in the other. And yet, with all these wonderful advantages, hypnotism has not been able to maintain its place as a mode of treatment; it has passed entirely away, and only remains as a memory of one of the most remarkable manias of this century. We still occasionally find pictures of hypnotic effects in one or other of the many monthly magazines of the present day, and we also read of sensational cures, especially of such moral insanities as drunkenness; but the advocates of

temperance do not seem to have found in hypnotism any permanent help in the good work they are engaged.

M. Charcot of Paris, who had perhaps a larger experience than any other physician of all kinds of nervous affections and of the influence of hypnotism upon them, and who devoted a lifetime to their elucidation, arrived finally at the conclusion that "for all curative purposes hypnotism is very rarely useful, generally entirely useless, and often injurious." But Mr. Ernest Hart, who took the greatest pains to investigate the matter, says most decidedly that "hypnotism, when it is not a pernicious fraud, is a mere fatuity which should have no place in the lives of those who have work to do in this world." I regard Mr. Hart's definition as more trustworthy than that of M. Charcot.

There is still another form of insanity which can scarcely be called epidemic, because, while it has existed more or less in all times, it never seems to have affected large bodies of men simultaneously in the same incontrollable manner as the epidemic insanities already described. It seems always to have been endemic rather than epidemic, and to have affected always, as it certainly does now, certain coteries or limited circles, rather than whole cities or peoples. I refer to what has been variously termed Spiritism or Spiritualism, a method of prying into the secrets of the future either of this world or the next, by interrogating the spirits of the dead with all the accompanying phenomena which are supposed to prove and to emphasise the actual presence of these spirits. Some salve their consciences for thus seeking to be wise beyond what is written, by declaring that they seek for some definite statement from the Beyond as a bulwark for their tottering faith, and a safeguard against the attacks of agnosticism. But without impugning the good faith of those who thus speak, we cannot forget who it was that said, "If they believe not Moses and the Prophets, neither will they be persuaded though one rose from the dead," a statement as true now as it was eighteen hundred years ago.

From the earliest ages of mankind there have been amongst them witches and wizards who claimed to have familiar spirits and to be able to recall the spirits of the dead and to interrogate them as to the hidden things of the future. And we have one most pathetic record, where one of Israel's greatest kings, a man whose miserable failure and untimely end we cannot help deploring, on the eve of his last battle sought to know what was to befall him by consulting her who is called "the Witch at Endor." And from the history of that interview we can guess that those who in those days boasted of their familiar spirits were much the same as our modern spiritualists, for, while the witch at Endor pretended to be able to recall spirits from the world beyond, she gave "a great cry" when Samuel did appear, obviously much more astonished at his appearance than those who had come to

consult her. They believed in her powers—her own “great cry” revealed how mistaken they were.

In the early part of this century (1847), two young American girls named Fox, one 12 and the other only 9 years of age, seem to have given a fresh start to spiritualism; and the great apostle of the craft, Mr. Daniel Dunglass Home, who came to England in 1855, and subsequently visited all the Courts of Europe, gave repeated and singular so-called “manifestations.” But, after all, what did they amount to?—heavy bodies, in some cases men, were seen slowly to rise in the air and remained floating without visible or tangible support. Hands or figures, not human, were seen to float through the air with life-like appearance and mobility; those present at the séances were sometimes pinched in various parts of the body without visible agency, and many other phenomena all of a similar character. Even predictions were sometimes hazarded which occasionally turned out to be correct. In this, however, the spirits were not superior to ordinary mortals, for the tipsters of the Derby or St. Leger do not traffic in spirits, except in those of a very material character, and yet some of their prophecies do occasionally come right—both classes of prophets thrive upon the memory of these accuracies, the inaccuracies are forgotten. Upon one occasion, Mr. Home was reported to have been seen to float out of one window and in at another two storeys above the ground, whereupon a writer in the *Edinburgh Medical Journal* suggested that he should be dropped down a coal-pit and if he managed to float up we should all believe in him. Strange and inexplicable things do occasionally happen in this world, but we may rest assured that if our friends in the next had anything to communicate to us, they would take care that the message was communicated distinctly and without ambiguity. It seems childish to rest our belief of the existence of a soul upon the puerile manifestations of spiritualistic mediums. Nay more, still further to complicate matters, it has been suggested that there are spiritualistic apostles of materialism who exhibit true phenomena and call them shams solely to discredit the doctrine of the existence of a soul, a doctrine of which spiritualists believe these manifestations to be a direct and sensible proof.

The only time when spiritualism threatened to become an epidemic was at Rochester, in America, whither one of the Fox girls had been sent by her father to get rid of the spiritual annoyances, as she was the one in whose presence they were most manifest. Instead of ceasing on the change of scene, the spirit rappings became more and more insistent. They explained, after their own fashion, that they wished an alphabet employed on which replies to inquiries could be spelt out. One committee after another was selected to investigate the mystery, but the spirits succeeded in converting them all; they set the whole town by the ears, got the facts reported in all the journals, and finally

started a spiritualistic campaign throughout the whole country, which has extended more or less over the whole world. The literature of spiritualism is most full and copious, but it does not appear that any single fact of importance has been revealed by its agency. It is but another of those insanities which arise from the desire to pry into the unknowable, its votaries forgetting that "it is a great part of human wisdom to be willingly ignorant of many things, with a quiet mind."

This cursory review of sporadic and of epidemic insanities is fraught with several lessons: first, it teaches us that insanity is a disease of which no one need be ashamed, as some of the finest minds in all ages have similarly suffered. It is not a disease of the mind or intellect, but only of that organ—the brain—by which our minds are able to communicate with our fellow-men. And we must always remember that this brain-trouble is very often only functional, and not organic. This means that it is curable if early and properly treated. But we know from the history of functional ailments in other organs, that if neglected at this stage, a curable affection is apt to become incurable, and even at the best the affected organ becomes so ill-nourished and enfeebled that much time and much care are required to restore it to its former healthy condition. As the brain is the organ of thought, when ill or enfeebled, whatever excites it injures it, and it is often necessary to remove such patients from their homes for the sake of securing perfect quiet and the absence of any irritating influences, and very often much harm results from undue delay in having recourse to this most beneficent and most needful form of treatment. It should never be forgotten that the harm that may result is not merely postponement of recovery, that is certain, but it may even amount to a permanent weakening of the brain.

The second lesson to be learned is that, as the great object of all education is to enable us to control the emotions and passions, and to regulate the imagination by the cultivation of the faculties of judgment, comparison, and attention; and as whatever tends to emancipate the lower powers of our nature from the wholesome control of our judgment, and our will is injurious to our intellectual well-being—we ought to shun all forms of mental excitement, under whatever names they present themselves, which tend to enfeeble our will, or to rouse the emotions and kindle the passions at the expense of those powers which have been given us for their regulation and control, assured that no form of even a minor mania has ever passed over the surface of society without leaving behind it many sad traces of its injurious action.

ON INTRA-PERITONEAL RUPTURE OF SIMPLE OVARIAN CYSTS, WITH SPECIAL REFERENCE TO OPERATIVE TREATMENT.¹

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THE spontaneous rupture of simple ovarian tumours, though a comparatively uncommon accident, is a subject worthy of more consideration than has hitherto been devoted to it. In the course of the operations I have performed for these growths, I have met with three cases in which the cyst wall was torn and the contents evacuated into the peritoneal cavity, while in three other cases a distinct history of previous rupture was elicited.

When considered in detail, individually and collectively, they present points of sufficient practical importance to warrant attention, I trust, worthy of the Fellows of this Society, and it is on this assumption I take the opportunity of bringing the subject before you. The cases are as follows:—

CASE 1.—MRS. C., æt. 53, I saw in 1892 with Dr. M'Donald Robertson. She had complained for over a year of an abdominal swelling, for which she had refused operative treatment. One day on poking the fire she suddenly experienced an intense pain in the abdomen, which gradually increased. On examination twenty-four hours afterwards, the abdomen appeared diffusely distended, and was so tender that palpation could only be accomplished under an anæsthetic. By bimanual examination an ill-defined fulness of the abdomen could alone be made out. Pulse, 120; temperature, 99°·6. From the previous history of tumour in abdomen, it was decided to explore the abdomen without delay, as it was evident some active change was present. Laparotomy showed the peritoneal cavity to be filled with a thick, deeply blood-stained fluid, which had escaped from an ovarian cyst, at the same time the peritoneum was red and congested. The cyst was removed and the peritoneal cavity flushed out and cleaned, and a glass drainage tube left in the abdominal wound when closed. Recovery was uninterrupted.

CASE 2.—MRS. H., æt. 35, recommended by Dr. Hutton, suffered from a medium-sized ovarian tumour. As operation was not urgent, she desired to wait a few weeks, which was agreed to. In three weeks she returned, stating she thought the growth had much decreased in size as evidenced by the fit of her corsets. On examination now, the abdomen, though distended, presented a changed appearance to formerly. No well-defined tumour was present, merely a diffuse abdominal distension. After careful measurements were made, it was decided to wait for results. On returning three weeks later, the measurements were slightly greater than before, and though the patient was comparatively comfortable, I recommended operation.

On opening the abdomen, it was found to be filled with a thick gelatinous fluid, which had escaped from a displaced cystic growth

¹ Read before the Obstetrical Society, Edinburgh, January 9, 1901,

of the left ovary. The peritoneum appeared healthy. The collapsed cyst was removed easily, as there were no adhesions, and an attempt was then made to cleanse the peritoneum of the sticky viscid fluid. This proved very partially successful, but as from the history of the case the fluid appeared innocuous, I decided to close the abdomen without draining, and a quart of saline solution was introduced before closure. The result proved highly satisfactory.

CASE 3.—Miss L., æt. 25, recommended for operation by Dr. Stirling, Perth, suffered from a large ovarian cyst. Not having a vacant bed in my hospital to give her, I asked her to return in a month. The patient returned as asked, in her usual health, and I did not examine her again previous to operation; but when about to operate I was much struck with and commented on the change in the contour of her distended abdomen. On entering the peritoneal cavity, I found it filled with a dark, blood-stained fluid of the consistence of porter. The peritoneum was deeply injected, and the collapsed cyst wall was very extensively fixed to the surrounding structures by highly vascular recent adhesions, which were very easily separated. After removal of the cyst the peritoneum was flushed out, two quarts of saline left in the cavity, and the abdomen closed without drainage. Recovery was uninterrupted.

For the notes of Case 4 I am indebted to Professor Kynoch, Dundee, under whose care she was treated. Patient, æt. 68, complained of abdominal swelling, which she had noticed for eighteen months. She previously had an abdominal swelling thirteen years ago, which had twice been tapped at intervals of three years; but six years ago, when on the way to have it again tapped, she was run over by a cyclist, and on getting up felt the abdominal swelling no longer. For a few days after her accident she passed considerably larger quantities of urine than usual. The present swelling, which reached up to the umbilicus, she had known of for eighteen months.

Laparotomy revealed extensive adhesions to the abdominal wall. The contents of the main cyst were thick and gelatinous, a few smaller secondary cysts were noticed, but no appearance of scar from previous rupture.

CASE 5.—Miss S., I also saw with Dr. Stirling, Perth, in 1886. She suffered from an ovarian tumour, which, as an eminent gynæcologist had refused to remove, had been tapped frequently for four years. Two years previously to the growth of the present swelling she had suffered from a similar abdominal swelling, which had suddenly disappeared. An attempt at removal was undertaken, but proved unsuccessful, as no line of demarcation between cyst wall and abdominal parietes could be made out. I decided therefore to evacuate and drain the cyst, irrigating the cavity with weak iodine lotion, 1 dr. to the pint. Irrigation was continued for twelve months till the cyst was entirely obliterated. Though it is now fourteen years since, there has been no return of the swelling, and the patient is in good health.

CASE 6.—Miss D., æt. 26, was sent for operation by Dr. Davidson, suffering from an ovarian tumour. She gave the history that five years previously she had a similar abdominal swelling, which under medicinal treatment entirely disappeared.

On abdominal incision an exactly similar condition to Case 5 was present, the cyst wall and abdominal parietes being thoroughly incorporated. Although I tried to separate them at several points, attempts to invert the cyst failed, and showed posterior adhesions. I therefore decided on a similar mode of treatment. Evacuated the cyst and irrigated. In five months the cyst became obliterated, and although it is now only two and a half years, there is no evidence of return by the most careful bimanual examination.

On reflecting over the cases cited, one is struck by the marked difference in the clinical features which may be presented.

In the majority of instances, rupture is apparently unassociated with discomfort, and it is therefore only in those cases where they have been of sufficient size to have attracted attention that any knowledge of such an occurrence can be elicited. It is probable, therefore, that spontaneous intraperitoneal rupture is common in small cysts which have not given rise to any symptoms (as is usual in such tumours), and it is also probable that before the days of ovariectomy many large cysts have through rupture become spontaneously cured. Now, however, they have little chance of such a termination, as their complete removal has become an operation of such comparative safety.

The absence of symptoms is doubtless due to the innocuous contents of the cyst and to their slow escape, a sudden gush being prevented by the intra-abdominal pressure—the peritoneal cavity being merely potential. The large proportion of recorded cases are examples similar to Case 1, in which severe and dangerous symptoms supervened. Thus Palm, in his collected statistics of twenty-five cases, records eighteen deaths, three from collapse, six from acute peritonitis, three from chronic peritonitis, and six from protracted fever.] Likewise, Nepreu, in 155 cases, shows sixty-five to have terminated fatally. In these instances the contents of the cyst must have been intensely irritating, and in many cases probably septic, while in a certain proportion death was accounted for from hæmorrhage. The causes of rupture are numerous, such as violence, morbid processes in the cyst wall, the result of thrombi, and intracystic hæmorrhage. Nutritive disturbances on the wall, the result of tension of the pedicle, is a further frequent cause. Perhaps the commonest variety of cyst to spontaneously rupture is that with gelatinous contents, the cyst wall becoming secondarily softened. The gelatinous contents are, as a rule, more irritative, but at the same time are but slowly absorbable by the peritoneum, and may continue to distend the abdomen. It is therefore possible that this accounts for the greater frequency with which they are found ruptured, as when the contents of a cyst are more fluid and more readily absorbed, operation is seldom undertaken after collapse of the cyst and disappearance of the abdominal swelling. Indeed, from the history of Case 2, it would appear as if, after

rupture of a gelatinous cyst, secretion of the mucoid contents continues and further distends the abdominal cavity.

In cysts with innocuous contents, where no abdominal symptoms supervene after rupture, it is important from a practical standpoint to consider their further causes. In a certain proportion, ready absorption of the extravasated contents occurs, and permanent obliteration of the cyst follows. This occurs most frequently in unilocular broad ligament cysts, where the fluid is practically normal saline solution and is extremely rapidly absorbed, giving rise to temporary polyuria. Whether in these cases there is actual intraperitoneal rupture or merely rupture of the cyst wall, and evacuation of the contents between the layers of the broad ligament walls, is doubtful. I am inclined to think that in the majority of cases the rupture is extraperitoneal.

In another series of cases there is a ready absorption of the escaped fluid, without peritoneal irritation, but the tumour reappears from redistension of the cyst or growth of secondary cysts. This must be looked upon as of comparatively frequent occurrence, for to those of us who have the opportunity of examining many ovarian tumours, evidence of such is frequently found by the presence of cicatrices in the cyst wall.

When, however, the contents of the cyst, though absorbable, tend to cause irritation of the peritoneum of a subacute type, we have inflammatory adhesions formed between the cyst wall and surrounding structures, which, on redistension of the cyst, may form an almost insuperable barrier to subsequent removal, as in Cases 5 and 6.

That this is so is borne out by experience, not only in cases of rupture, but also after tapping. I have removed cysts which have frequently been tapped and yet found no adhesions, while, on the other hand, as is well known, previous tapping undoubtedly predisposes to adhesions. In the former it is probable the cyst contents are more irritative, while in the latter they produce chronic peritonitis with resulting adhesions. Though sufficiently irritative to produce adhesions, these may be so insidiously formed as to give rise to no symptoms of pain or discomfort, and we may infer that in many of those closely adhered tumours which have never been tapped, the adhesions are the result of previous rupture of a loculus. Fortunately the strongest and most frequent seat of adhesions is between the cyst and the surrounding parietes or omentum,—as ready adhesion to the intestines is prevented by their constant movement.

In a certain group of cases, practically lacerated cysts with gelatinous contents, no absorption takes place. At the same time, from mucoid degeneration of the cyst wall the seat remains patent, and active secretion continues, which results in a steady increase of abdominal distension from free intraperitoneal fluid.

Treatment.—Assuming that what has been stated regarding

the effect of rupture be correct, there can, I think, be but one opinion that ruptured cysts should in all cases be removed as soon as possible. Doubtless it is true that after rupture a certain proportion disappear never to redistend, and spontaneous cure is attained; but, on the other hand, it is equally certain that a certain proportion redistend after having acquired a close connection to the surrounding structures through inflammatory adhesions, which at the best complicate severely their subsequent removal, and may, as in Cases 5 and 6, practically prevent their enucleation altogether. I may say that these two cases are the only simple ovarian cysts I have felt justified in not attempting to remove, out of a series of over 100 operations for these tumours.

I have on other occasions found strong adhesions to the anterior abdominal walls, but by being able to partially invert the cyst walls, have convinced myself that the adhesions were more or less local, and so proceeded to remove the cyst. In Case 6, however, my attempt at inversion was useless.

Having been certain of the presence of an ovarian tumour, its sudden or gradual disappearance should be an incentive to operation, although to the patient and her friends it usually appears otherwise. This line of treatment naturally assumes an absolute certainty of diagnosis of the pre-existing tumour, which in large growths is more or less easy.

In smaller tumours, however, which have not attracted the patient's attention by abdominal distension, the situation is more involved and difficult, and the question of operation must equally depend on the operator's estimate of his diagnostic powers. To my own mind I am certain of having felt on one occasion a cystic ovarian tumour the size of a cocoanut, which on subsequent examination some weeks after had disappeared. In this instance, I regret to say, I had not the force of character to justify me in operating, although the first time I saw the patient I strongly urged the procedure.

If a ruptured cyst has not been diagnosed at the time of operation, one is apt, in entering the peritoneal cavity, to be misled by the gush of ovarian contents to assume that the cyst wall has been incised and an attempt made from suspected adhesion to the abdominal parietal to separate the cyst wall. In these cases one is liable, as I did in one instance, to strip the parietal peritoneum from the abdominal wall. It is well, therefore, in all cases where any contents thus escape, to enlarge the opening and introduce the hand into the cavity before attempting to separate the cyst wall.

The treatment of perforated cysts associated with acute symptoms, it need hardly be said, must be operative. The diagnosis, however, of their condition must in certain cases be extremely doubtful, unless a distinct history of pre-existing abdominal tumour be present. The symptoms are so closely simulated by perforation of the intestine, and other acute affections

of the peritoneum, that in the majority of instances the operation must, in the first instance, be purely exploratory. Should a ruptured cyst be found, after removal of the growth, free irrigation of the abdominal cavity will be called for, and if subsequent drainage, preferably through the posterior fornix.

In conclusion, I may add I have confined myself to the rupture of simple cysts, to the exclusion of the papillomatous variety, which are locally malignant and have a special predisposition to perforation of the cyst wall. From our inability to diagnose these without visual examination, and appreciating their tendency to secondary peritoneal infection, an additional incentive is added to the immediate removal of all ovarian cystic growths, an operation which, when early undertaken, is, thanks to our improved aseptic methods, almost devoid of risk.

THE BACTERIAL TREATMENT OF LONDON CRUDE SEWAGE AT BARKING AND CROSSNESS.

By A. C. HOUSTON, M.B., C.M. (Edin.), D.Sc., F.R.S.E.

(PLATES VI.-VIII.)

IN February 1898 I was directed, by the Main Drainage Committee of the London County Council, to investigate, from the bacteriological point of view, the experiments in progress at Barking and Crossness, on the bacterial treatment of sewage. The work occupied two years, and three reports and a supplementary one have been published on the subject.¹ This article is written with the object of recording, in concise form, the chief results arrived at during the course of the investigation.

Although the study of fermentation and the proper understanding of the true nature of putrefactive processes are attended with great difficulties, the aim and object of the biological treatment of sewage is sufficiently plain and simple.

In nature the following cycle of transformation takes place:—Dead organic matter decays as the result of the vital activity of bacteria, and ammonia is liberated. The nitrifying organisms bring about the oxidation of the ammonia, first to nitrous and then to nitric acid. These acids, by reaction upon the bases always present, form nitrites and nitrates, and these nourish the living plant. While the nitrogen is undergoing these changes, the carbon of the organic matter is converted into carbonic acid, and the hydrogen mainly into water. To some extent, also, the nitrogen and hydrogen are liberated in the free gaseous state.

¹ "Report on the Bacteriological Examination of London Crude Sewage," First Report. "Bacterial Treatment of Crude Sewage," Second Report. Supplement to the Second Report. "Bacterial Treatment of Crude Sewage," Third Report. By Dr. Clowes and Dr. Houston.

Now the organic matters found in sewage are partly in suspension and partly in solution, and sewage contains in itself the necessary living germs for the destruction of both these forms of organic matter. The aim and object of the biological treatment of sewage is to render soluble, by microbial agencies, the solid matters, and to split up, by the action of living bacteria, both the matter thus dissolved and the organic compounds which were originally in solution, into their simpler elements. In the final process of purification these substances should undergo oxidation, induced by the life processes of nitrifying organisms, and an effluent should be produced which is free from putrescible matter, and contains only inorganic or mineral substances.

I. BACTERIAL PROCESS.—The bacterial process employed was that known as “intermittent contact,” or, more commonly, as Dibdin’s process. In this process—(1) sewage is poured upon the bed from above, so as to completely and rapidly fill it; (2) the sewage is then allowed to rest in the bed for several hours; (3) the bed is next emptied and allowed to remain empty for several hours. The subsequent refilling of the bed with fresh sewage is the commencement of a fresh cycle of operations.

The experiments varied in a number of different ways. For example, they varied as regards—(1) depth and capacity of beds; (2) number of fillings per day; (3) composition and size of material of beds; (4) single or double treatment, etc.

II. BACTERIAL BEDS.—To give an accurate account of the history of the different bacterial beds would occupy too much space. For full details, the reports themselves must be consulted.

The following brief notes are condensed from Dr. Clowes’ statements:—

Four-ft. coke bed at Crossness.—Tank A, 22 ft. 6 in. long, 10 ft. 8 in. wide, 12 ft. deep. Superficial area, $\frac{2}{3}\frac{2}{3}$ of an acre. Material, coke. Depth of coke, 4 ft. Size, walnut size. Sewage capacity, 3000 gals. (= 50 per cent. of volume occupied by coke and air space). Coke volume, 960 cubic ft. Between April 22, 1898, and February 1899, 339 fillings. 847,500 gals. of sewage treated. 32·4 cwt. (in dry condition) of solid matter removed from the raw sewage. Liquid treated, crude sewage.

Six-ft. primary coke bed at Crossness.—Tank C, of less regular shape than tank A, but of same area. Depth, 6 ft. Material, coke. Depth of coke, 6 ft. Size, walnut size. Sewage capacity, 4500 gals. Started regular work, September 1, 1898. Between September 1898 and February 1899, 213 fillings. Liquid treated, crude sewage.

Six-ft. secondary coke bed at Crossness.—Tank B, of precisely similar dimensions as tank A. Depth and size of coke and sewage capacity as above. Liquid treated, effluent from 6 ft. primary coke bed.

Thirteen-ft. coke bed at Crossness.—Material, coke. Depth of coke, about 13 ft. Size, walnut size. The same tank (B) was used as in the

6 ft. secondary coke bed series of experiments, the depth of coke being increased from 6 ft. to 13 ft. The object of the experiment was to ascertain whether an increase in the depth of the bed detracted from its efficiency. Liquid treated, raw sewage from February 27, 1899, to October 10, 1899; later, crude sewage after having undergone a short process of rapid sedimentation. Between February 27, 1899, and December 22, 1899, 337 fillings.

Coarse coke bed at Barking.—Tank, 4 ft. sq. by 6 ft. in depth. Material, coke. Size, passing 4 in. mesh, rejected by $\frac{1}{2}$ in. Depth of coke, 5 ft. Liquid treated, crude sewage.

Fine coke bed at Barking.—Tank, 4 ft. sq. by 6 ft. in depth. Material, coke. Size, passing $\frac{1}{2}$ in. mesh, rejected by $\frac{1}{16}$ in. Depth of coke, 5 ft. Liquid treated, effluent from the coarse coke bed.

Coarse ragstone bed at Barking.—Same remarks as under coarse coke bed, except that ragstone used instead of coke.

Fine ragstone bed at Barking.—Same remarks as under fine coke bed, except that ragstone used instead of coke, and the liquid treated was the effluent from the coarse ragstone bed.

The experiment covered twenty-nine weeks, and the ragstone and coke beds dealt respectively with 37,776 gals. and 42,864 gals. of raw sewage. The original capacity of the coarse coke and ragstone beds was 200 and 250 gals. respectively.

Barking primary coarse bed, series A	}
„ secondary „ „ „ A	}
„ primary „ „ „ B	}
„ secondary fine „ „ B	}

Tanks, 8 ft. square by 10 ft. in depth. Material, coke. Size, passing 2 in. mesh, rejected by $\frac{1}{2}$ in., for the coarse beds A A B; passing $\frac{1}{2}$ in. mesh, rejected by $\frac{1}{16}$ in., for secondary fine bed B. Depth of coke, 9 ft. 9 in. The two primary beds received crude sewage and the two secondary ones the effluent from the primary beds—

July 4, 1899 to July 15, 1899,	one filling per day.
„ 15 „ „ Sept. 21 „	three „ „
Sept. 21 „ „ Dec. 11 „	one „ „
From 11th December onwards,	two „ „

III. CHEMICAL RESULTS AND GENERAL CONSIDERATIONS.—The chemical investigations were carried out by Mr. E. Brooke Pike and Mr. J. W. H. Biggs, under the direction of Dr. Clowes, chief chemist to the council.

It is not proposed to deal with the chemical results beyond recording some of Dr. Clowes' conclusions.

Thus, in the second report, Dr. Clowes sums up the advantages of bacterial over chemical treatment, as follows:—

“As compared with the present process of chemical precipitation, and sedimentation, the bacterial process presents the following advantages:—(a) It requires no chemicals; (b) it produces no offensive sludge, but only a deposit of sand or vegetable tissue, which is free from odour. (c) It removes the whole of the suspended matter, instead of only about

80 per cent. thereof. (d) It effects the removal of 51·3 per cent. of the dissolved oxidisable and putrescible matter, as compared with the removal of 17 per cent. only effected by the present chemical treatment. (e) Further, the resultant liquid is entirely free from objectionable smell, and does not become foul when it is kept; it further maintains the life of fish."

In the third report, Dr. Clowes produces further proof of the advantage of bacterial over chemical treatment, and suggests the feasibility of experiments being carried out on a much larger scale. In this report a very important practical point is considered. Throughout the progress of the experiments the only serious objection that could reasonably be adduced against the employment of bacterial filters was the gradual but progressive choking of the beds. To some extent this difficulty was overcome by resting the beds, but not entirely, because the material causing the clogging was largely composed of cellulose and other matters only slowly acted upon by bacteria. Doubtless, also, there are other matters which accumulate in the beds which are practically indestructible by bacterial agencies. It was found that these objectionable matters could be largely removed by a simple rapid sedimentation of the crude sewage, and that the effluent from this sedimentation process, when applied in the usual way to a "contact" bed, produced no clogging effect. In this connection the following remarks, taken from Dr. Clowes' introductory summary to the third report, are worth quoting in full:—

"Last Christmas (1899) an experiment was made on the whole of the South London sewage by allowing it to flow at a comparatively rapid pace through one of the large settling channels at the outfall works. In this way the larger portion of the solid suspended matter of the sewage was deposited. A portion of the effluent from this sedimentation process was treated in a small bacterial coke tank, and was found to undergo the usual amount of purification, and to furnish an almost clear and entirely inoffensive and non-putrescible effluent. No reduction in the capacity of the coke bed occurred during the period of experiment. From this experiment it may be inferred that simple rapid sedimentation of the crude sewage on the large scale, followed by intermittent bacterial coke treatment, will furnish an effluent suitable for the lower river, together with a sludge deposit which could be dealt with in the usual way. It seems reasonable that the experimental treatment of the sewage by rough screening, followed by rapid sedimentation, without the previous introduction of chemicals, might now be attempted on a larger scale, and that by this means an effluent of much greater purity than that at present discharged might be sent into the river."

It seems desirable to here definitely state that I concur with Dr. Clowes in the advisability of adopting the bacterial method of treating London sewage in place of the chemical one. My reason for adopting this attitude, in the face of bacteriological

results seemingly the reverse of satisfactory, will be explained later.

In conclusion, and speaking in general terms, it may be said that the chemical results were very satisfactory. Thus the effluents from the bacterial beds were (1) practically free from suspended matters, (2) seemingly non-putrescible, and (3) showed a remarkable reduction in the amount of dissolved oxidisable matter as compared with the raw sewage. But it must not be assumed from this that I am necessarily convinced that the bacterial process used during the course of the inquiry is the best one available, or that the results, good as they unquestionably are, reach the highest point possible in the bacterial treatment of sewage.

IV. BACTERIOLOGICAL RESULTS.—Previous to the investigations at Barking and Crossness, there were few, if any, records dealing with the biological qualities of effluents from bacterial beds. Valuable reports, however, had been published on the bacteriology of crude sewage.¹ These reports dealt chiefly with the number of bacteria in sewage, and also with the bacterial flora of sewage. None of these, however, seemed to give adequate information on a number of points highly important as a preparatory step to the study of effluents from bacterial beds. For example, no systematic study had been made of the *relative abundance* of *B. coli* (and closely allied forms) in multiple samples of crude sewage. And no sustained observations had been carried out as regards the number of spores of *B. enteritidis sporogenes*. Yet these two microbes seemed to me to be of special and peculiar importance in connection with the study of bacterial filters. Both are characteristic of excremental matters; the former (*B. coli*) is an aërobie (facultative anærobie), some strains of which are pathogenic, and the latter (*B. enteritidis sporogenes*) is an anærobie whose cultures are extremely virulent to guinea-pigs, and which Klein has shown may be causally related to certain cases of acute diarrhœa in the human subject.²

It seemed, then, most desirable to ascertain the number of *B. coli* and *B. enteritidis sporogenes* in multiple samples of raw sewage, preliminary to the study of their number in the effluents from the bacterial beds.

Besides estimating the total number of bacteria in the sewage and effluents, numerous records were obtained as regards the number of liquefying micro-organisms and spores of aërobie

¹ For example—"Reports of the State Board of Health of Massachusetts" (1888-90, Part ii.); "Report by Sir Henry Roscoe and Mr. Lund," *Phil. Trans.*, London, 1892; "Report by Mr. Lawes and Dr. Andrewes, Micro-organisms of Sewage," 1894, London County Council.

² See reports by Dr. Klein, "Reports of the Medical Officer, Local Government Board, 1896-7-8-9"; also "Reports by Dr. Andrewes"; "Report of the Medical Officer, Local Government Board, 1896-97"; and *Lancet*, London, January 7, 1899.

bacteria. Further, as the work advanced, many other new lines of investigation were undertaken, some of which will be here briefly described. But it is evident that work covering so long a period cannot possibly be summarised, even in a cursory manner, within the limits of this article. Attention, therefore, will be directed to the main points of interest and importance:—

(a) *Total Number of Bacteria in 1 c.c. (Gelatin at 20° C.)*¹

Crossness crude sewage²—

42 samples	5,030,506
Effluent 4-ft. coke bed at Crossness—	
15 samples	4,966,666
Effluent 6-ft. primary coke bed at Crossness—	
8 samples	6,787,500
Effluent 6-ft. secondary coke bed at Crossness—	
3 samples	4,300,000
Effluent 13-ft. coke bed at Crossness—	
10 samples	5,364,000
Barking crude sewage—	
16 samples	5,705,344
Effluent primary coarse bed, series A, at Barking—	
4 samples	2,180,000
Effluent secondary coarse bed, series A, at Barking—	
7 samples	1,920,000
Effluent primary coarse bed, series B, at Barking—	
6 samples	2,700,000
Effluent secondary fine bed, series B, at Barking—	
7 samples	1,444,300

(b) *Number of B. coli (or Closely Allied Forms) in 1 c.c.*

Crossness crude sewage,³ 38 samples—

In 3 samples	less than 100,000.
In 6	1,000,000 or more.
In 29	at least 100,000, but less than 1,000,000.

Effluent 4-ft. coke bed at Crossness, 15 samples—

In 1 sample	less than 100,000.
In 14 samples	at least 100,000, but less than 1,000,000.

Effluent 6-ft. primary coke bed at Crossness, 8 samples—

In 1 sample	more than 1,000,000.
In 7 samples	at least 100,000, but less than 1,000,000.

¹ Seven comparative determinations of the number of bacteria in Crossness crude sewage capable of growing in agar at blood heat, as compared with gelatin at 20° C., yielded the following results:—

Gelatin at 20° C. = 5,758,571 in 1 c.c. (seven samples).

Agar at 37° C. = 3,294,444 " " "

² In illustration of the enormous number of bacteria in Crossness crude sewage, reference may be made to Plate VI. Fig. 1.

³ In illustration of the great number of coli-like bacteria in Crossness crude sewage, reference may be made to Plate VI. Fig. 2.

Effluent 6-ft. secondary coke bed at Crossness, 3 samples—

In 1 sample less than 100,000.

In 2 samples 100,000.

Effluent 13-ft. coke bed at Crossness, 10 samples—

In 1 sample less than 100,000.

In 9 samples 100,000, but less than 1,000,000.

Barking crude sewage, 10 samples—

In 2 samples more than 1,000,000.

In 8 „ 100,000, but less than 1,000,000.

Effluent primary coarse bed, series A, at Barking, 4 samples—

In 1 sample less than 100,000.

In 6 samples 100,000, but less than 1,000,000.

Effluent secondary coarse bed, series A, at Barking, 7 samples—

In 1 sample less than 100,000.

In 6 samples 100,000, but less than 1,000,000.

Effluent primary coarse bed, series B, at Barking, 6 samples—

In 1 sample less than 100,000.

In 5 samples 100,000, but less than 1,000,000.

Effluent secondary fine bed, series B, at Barking, 7 samples—

In 4 samples less than 100,000.

In 3 „ 100,000, but less than 1,000,000.

(c) *Number of Spores of B. enteritidis sporogenes (Klein) in 1 c.c.*¹

Crossness crude sewage, 48 samples—

In 17 samples (about 35 per cent.) at least 1000.

In 16 „ „ 33 „ „ 100, but less than 1000.

In 8 „ „ 16 „ „ 100.

In 4 „ „ 8 „ „ 10, but less than 100.

In 3 „ „ 6 „ „ 10.

Effluent 4-ft. coke bed at Crossness, 27 samples.

In 4 samples (about 15 per cent.) at least 1000.

In 7 „ „ 26 „ „ 100, but less than 1000.

In 11 „ „ 40 „ „ 100.

In 2 „ „ 7 „ „ 10, but less than 100.

In 2 „ „ 7 „ „ 10.

In 1 sample „ 3 „ less than 10.

Effluent 6-ft. primary coke bed at Crossness, 22 samples—

In 6 samples (about 27 per cent.) at least 100, but less than 1000.

In 9 „ „ 40 „ „ 100.

In 3 „ „ 14 „ „ 10, but less than 100.

In 3 „ „ 14 „ „ 10.

In 1 sample „ 4 „ less than 10.

Effluent 6-ft. secondary coke bed at Crossness, 15 samples—

In 1 sample (about 7 per cent.) at least 1000.

In 2 samples „ 13 „ „ 100, but less than 1000.

In 7 „ „ 47 „ „ 100.

In 3 „ „ 20 „ „ 10, but less than 100.

In 1 sample „ 7 „ „ 10.

In 1 „ „ 7 „ „ less than 10.

¹ In illustration of the characteristic changes produced in anaerobic milk cultures by the growth of this pathogenic anaerobe, reference may be made to Plate VI. Fig. 3.

Effluent 13-ft. coke bed at Crossness, 15 samples—

In 2 samples (about 13 per cent.)	at least 1000.
In 9 " " 60 " "	100, but less than 1000.
In 1 sample " 7 " "	100.
In 1 " " 7 " "	10, but less than 100.
In 2 samples " 13 " "	less than 100.

Barking crude sewage, 17 samples—

In 9 samples (about 53 per cent.)	at least 1000.
In 1 sample " 6 " "	100, but less than 1000.
In 4 samples " 23 " "	100.
In 1 sample " 6 " "	10, but less than 100.
In 2 samples " 12 " "	10.

Effluent coarse coke bed at Barking, 5 samples—

In 1 sample (about 20 per cent.)	at least 1000.
In 2 samples " 40 " "	100, but less than 1000.
In 1 sample " 20 " "	100.
In 1 " " 20 " "	less than 100.

Effluent fine coke bed at Barking, 7 samples—

In 2 samples (about 28 per cent.)	at least 1000.
In 2 " " 28 " "	100, but less than 1000.
In 1 sample " 14 " "	100.
In 2 samples " 28 " "	less than 100.

Effluent coarse ragstone bed at Barking, 5 samples—

In 3 samples (about 60 per cent.)	at least 1000.
In 2 " " 40 " "	100.

Effluent fine ragstone bed at Barking, 7 samples—

In 2 samples (about 28 per cent.)	at least 1000.
In 2 " " 28 " "	100, but less than 1000.
In 2 " " 28 " "	100.
In 1 sample " 14 " "	less than 100.

Effluent primary coarse bed, series A, at Barking, 4 samples—

In 2 samples (about 50 per cent.)	at least 1000.
In 2 " " 50 " "	100, but less than 1000.

Effluent secondary coarse bed, series A, at Barking, 7 samples—

In 3 samples (about 43 per cent.)	at least 1000.
In 3 " " 43 " "	100, but less than 1000.
In 1 sample " 14 " "	100.

Effluent primary coarse bed, series B, at Barking, 6 samples—

In 2 samples (about 33 per cent.)	at least 1000.
In 2 " " 33 " "	100, but less than 1000.
In 2 " " 33 " "	100.

Effluent secondary fine bed, series B, at Barking, 8 samples—

In 6 samples (about 75 per cent.)	at least 100, but less than 1000.
In 1 sample " 12 " "	100.
In 1 " " 12 " "	less than 100.

(d) *Number of Bacteria causing Liquefaction of Gelatin.*

(e) *Number of Spores of Aërobic Bacteria.*

For details under the above headings, reference must be made to the reports, but here it may be stated that in crude sewage the number of bacteria causing liquefaction of gelatin is likely to be not less than 1,000,000 per c.c., and the number of spores of

aërobic bacteria between 300 and 400 in 1 c.c. Further, that although the effluents from the bacterial beds showed a diminution in the number of liquefiers and spores, as compared with the crude sewage, the reduction was so slight as to be of little or no importance.

(f) *Result of a General Comparison of the Cultures made from the Crude Sewage and those made from the Effluents.*

The cultivations made from the crude sewage and effluents were examined, side by side, on numerous occasions; yet no distinct differences could be made out between the two sets of cultures as regards the species of microbes, and the relative abundance of the different kinds of micro-organisms seemed to be unaffected by the biological treatment of the sewage.¹

Summary at this stage.—In general summary of these results it may be said that—

Although the effluents from the bacterial beds contained on an average fewer bacteria, liquefying microbes, spores of aërobic bacteria, *B. coli*, and spores of *B. enteritidis sporogenes* than the raw sewage, the reduction was not well marked, and indeed was immaterial, considering the large number still remaining.

(g) *Experiments on Animals.*

Injection of Crude Sewage and Effluents into Guinea-pigs.

1. The subcutaneous injection of Barking and Crossness crude sewage into guinea-pigs (about 1 to 3 c.c. per 200 grms. weight) always produces a local reaction, and usually death in from twenty-four to seventy-two hours. Sometimes the effluents from the coke beds are more pathogenic than the raw sewage, but usually a somewhat large dose of effluent is required to produce a fatal effect.

2. If the injection of the crude sewage or effluent is not followed by fatal results within the first few days, the animal may occasionally die after the lapse of some weeks' time from pseudo-tuberculosis (*B. pseudo-tuberculosis* of Pfeiffer).

3. When the animal dies rapidly (twenty-four to seventy-two hours), virulent microbes, belonging to the class of *B. coli* and *B. proteus*, may readily be isolated from the blood or tissues of the animal.

4. If the crude sewage or effluent be previously heated to

¹ That, however, some selective process is at work in bacterial beds, need hardly be doubted. For example, raw sewage contains little or no oxidised nitrogen, whereas the effluents from bacterial beds contain nitrites and nitrates often in considerable amount. This alteration in the chemical state of the liquid is brought about by nitrifying bacteria, and it is highly probable that these particular microbes multiply and accumulate in the beds, and that the effluents from the beds contain more nitrifying organisms than the crude sewage.

100° C. for one hour, large doses may be injected without producing a fatal result.

5. If the crude sewage or effluent be previously heated to 80° C. for ten minutes, a pathogenic effect may still be produced; but a much larger dose is usually required than when the liquid has not been so heated.

6. If the crude sewage or effluent be filtered through a sterilised Pasteur's filter, very large doses of the filtrate fail to produce a pathogenic effect.

(h) *Notes on the Deposit which accumulates on the Coke Fragments of the Coke Beds at Barking and Crossness.*

It was discovered during the course of the inquiry that the sewage capacity of the coke beds decreased, and in the case of the 13-ft. coke bed the decrease was determined to be proceeding at the rapid rate of 1 per cent. of the original capacity per week. The coke was found to be coated with a black-coloured slimy deposit, free from objectionable smell, and almost odourless. When looked at under a low power of the microscope, it was seen to be composed largely of minute particles of sand and coke, together with apparently imperfectly disintegrated animal and vegetable matter. This organic matter is probably of such a nature as to resist the action of bacteria for a very considerable time, if not almost indefinitely. The number of bacteria per grm. of deposit was found to be 1,800,000. This number of microbes, large as it may appear, would weigh only a fraction (about 0.0000147) of a grm., so that it is evident that the number of living bacteria do not in themselves account in any way for the deposit. The number of spores of *B. enteritidis sporogenes* was found to be at least 10,000, but less than 100,000 per grm. of deposit. As compared with crude sewage, the deposit contained more spores of *B. enteritidis sporogenes* and fewer *B. coli*.

Two mice inoculated subcutaneously with a small portion of the deposit, died with all the characteristic symptoms of tetanus.

The deposit was mixed with sterile water, and cover-glass preparations made. When these were stained with the usual aniline dyes, and in the ordinary manner, only a limited number of bacteria reacted to the stain. Stained, however, as for tubercle, the result was different. In short, it was found that a considerable number of bacteria retained the red stain after treatment with 33 per cent. nitric acid (Plate VIII. Fig. 4). Moreover, some of the "acid-fast" bacteria could not with certainty be morphologically distinguished from the tubercle bacillus. By centrifugalising large quantities of crude sewage and effluents, the same results were usually obtained; particularly was this the case as regards the effluents. But while some of these "acid-fast" bacteria resembled the tubercle bacillus, others differed from it in a number of respects.

Guinea-pigs were inoculated with small quantities of the deposit. The result was negative (*i.e.* as regards tubercle) in all cases but one, and here the deposit was obtained, not at Barking and Crossness, but from a bacterial coke bed which had been treated with sewage for a considerable time, and worked on similar lines to those adopted at the northern and southern outfall works. In the positive experiment the guinea-pig died after the lapse of some weeks, and on examination presented the usual appearance of tuberculous infection. Moreover, section of its organs, when appropriately stained, showed the presence of numerous tubercle bacilli (Plate VIII. Figs. 5 and 6).

It was concluded from these experiments, "that even if some of the 'acid-fast' bacteria collecting in the coke beds are those of the tubercle bacillus, they have for the most part lost their infective power. Nevertheless the single positive experiment recorded tends to destroy the belief that *none* of the bacteria in question are those of tubercle, or that, being tubercle, they have *all* lost their infective power." "In conclusion, no further claim is made, than this—(1) In crude sewage, in bacterial coke beds, and in the effluent from bacterial beds, there are certain bacteria which, after being stained with hot carbol-fuchsin, resist decolorisation with 33 per cent. nitric acid. (2) Some of these 'acid-fast' bacteria cannot with certainty be morphologically distinguished from the tubercle bacillus. (3) In one instance a guinea-pig inoculated with the deposit accumulating on the coke of a bacterial bed died, and presented, on examination, the appearance of death from tuberculous infection, and sections of its organs, when appropriately stained, showing the presence of numerous tubercle bacilli."

(i) *The Vitality of the Cholera Bacillus and Staphylococcus pyogenes aureus in Crossness Crude Sewage.*

Cholera Bacillus.

A portion of a pure culture of the cholera bacillus was added to 10 c.c. of unsterilised Crossness crude sewage contained in a sterile test tube. The tube was plugged with sterile wool and kept in a dark cupboard at room temperature. The presence of Koch's vibrio was tested for from time to time by the peptone method.

Without going into detail, it may be stated that in one experiment the cholera bacillus seemed to have lost its vitality in less than a fortnight; in another experiment it remained alive for nearly four weeks.

Staphylococcus pyogenes aureus.

In this experiment, 10 c.c. of unsterilised Crossness crude sewage were inoculated with a platinum loopful of a young agar culture of *Staphylococcus pyogenes aureus*. From time to time a

loopful of the sewage (+*Staphylococcus pyogenes aureus*) was rubbed over the surface of a series of oblique tubes. These were incubated at 37° C., and the presence of *Staphylococcus pyogenes aureus* was readily detected by its characteristic orange-coloured growth.

Up to the twenty-fourth day after the original inoculation, the presence of *Staphylococcus pyogenes aureus* was readily demonstrated. A negative result was recorded on the thirty-fifth day, but on the thirty-eighth day a single colony of *Staphylococcus pyogenes aureus* was discovered. Later, it could not be found in the agar cultivations.

In conclusion, it may be as well to quote from the report as follows:—

“The cholera bacillus and *Staphylococcus pyogenes aureus* are capable of retaining their vitality in Crossness crude sewage in competition with the very numerous bacteria normally present in the liquid, for a considerable time. But it must be insisted upon that the conditions prevailing in laboratory test-tube experiments are widely different from those in operation in biological coke beds. Nevertheless, and looking at the subject from the point of the epidemiologist, these experiments are far from reassuring, and indeed would seem to indicate that the antagonism of the saprophytic bacteria normally present in sewage would not suffice for the destruction of pathogenic species, either in the sewers or, later, in the bacterial beds. Since the bacterial beds are purposely constructed so as not to mechanically hold back the suspended matters, and as it is to be feared from these experiments that the biological processes at work in the coke beds would not rapidly destroy the life, although they might inhibit the multiplication of pathogenic germs accidentally introduced into the crude sewage, the effluents from the beds ought to be regarded as no more safe in their possible relationship to disease than the raw sewage itself. It must be remembered, however, that the number of the pathogenic germs added to the sewage in the experiments was vastly greater than could conceivably take place under natural conditions, and that, notwithstanding the enormous number introduced, there was definite indication of a somewhat rapid decrease in their numbers.”

(j) *Notes on other Microbes (besides B. coli and B. enteritidis sporogenes) found in the Crude Sewage and Effluents.*

For notes under this heading reference must be made to the various reports. But it may not be amiss to point out that an organism indistinguishable from the bacillus of green pus (*B. pyocaneus*) (Plate VIII.) Fig. 7 was isolated from $\frac{1}{1000}$ c.c. of the effluent from the secondary coarse bed (series A) at Barking. One c.c. of a broth culture of this microbe injected subcutaneously into a guinea-pig killed the animal in less than twenty-four hours, and the organism was recovered in pure culture from the heart's blood, spleen, etc.

A micro-organism described under the term *Sewage proteus* was found to be habitually present in the crude sewage and effluents in numbers usually exceeding 100,000 per c.c. Some strains of this microbe were very virulent.

In the second report a description of this bacillus is given, and a number of other bacteria (some belonging to new species) are also described in detail.

(k) *Streptococci* (Plate VIII. Figs. 8, 9, and 10) in *Barking and Crossness Crude Sewage, and in the Effluents from the Bacterial Coke Beds.*

This portion of the inquiry is believed to be of special and peculiar importance, because, speaking of streptococci as a class, it may be said that—

1. They are among the most *pathogenic* of all the bacteria which are at present known.

2. They are *delicate* germs, which readily lose their vitality and die.

3. They are present in the *intestinal discharges* of animals. In human faeces there may be more than 1000 present in 1 grm.

4. They are seemingly absent from water and soil, except in those cases where there has been *recent* contamination with sewage or other substances equally objectionable in character.¹

Both in the crude sewage and in the effluents from the bacterial bed, streptococci were present in abundance—usually more than 1000 in 1 c.c. Now, if the streptococci found in such numbers in the crude sewage and effluent are derived from the intestinal contents of animals, and are delicate germs, and are also pathogenic, the position is a somewhat serious one.

As regards *pathogenic* action, the streptococci were usually found to be non-pathogenic in the case of mice. But this does not imply absence of disease-producing property in other animals, or that at a stage previous to their isolation the streptococci were non-pathogenic.

Secondly, as regards the assertion that streptococci are *delicate* germs. This certainly accords with our knowledge of streptococci, causally connected with morbid processes in the human subject. But it might well be the case that some at all events of the streptococci occurring in nature outside the animal body, *e.g.* in sewage, are in comparison hardy germs. Nevertheless it cannot, I think, be without significance that certain of the streptococci isolated from crude sewage and effluents, when subcultured in gelatin and incubated at 20° C., showed little or no appreciable growth at the end of thirteen days.

Lastly, as regards the *source* of streptococci, it has been said

¹ See my reports on soils and water to the Loc. Gov. Board, "Report of the Medical Officer, Local Government Board, 1898-99."

that they are present in the intestinal discharges of animals, and are seemingly absent from waters and soils, except in cases of *recent* and objectionable pollution. It might perhaps be argued that streptococci may have a wide distribution in nature, and if so that their presence in a substance, be it soil or sewage or water, is of little or no significance. Against this view it may be pointed out that, if they are delicate germs, it is unlikely that they would survive, much less multiply in nature, unless the condition were ideally favourable. Further, that although I have frequently isolated streptococci from as minute a quantity of sewage as 0.001 c.c., and of human fæces as 0.001 grm., I have repeatedly failed to demonstrate their presence in comparatively large amounts of pure water and pure soil.

In conclusion, I venture to assert that this test is of extreme value in judging sewage effluents from the biological point of view. And I am strongly of opinion that if an effluent contains streptococci in practically unaltered numbers, or even in reduced numbers, where such reduction is only in the same proportion as the other microbes also present are reduced, then such an effluent is, as regards danger to health, no better in the first case than raw sewage, and no safer in the latter than crude sewage slightly diluted, but otherwise unaltered in its possible capacity of giving rise to disease.

(l) *The Effluents from the Bacterial Beds in relation to the Spread of Disease.*

At the last meeting of the British Medical Association, one of the subjects of discussion was—"Can modern systems of sewage treatment be depended upon to remove the *B. typhosus* and allied organisms?"¹

In opening the discussion, I dealt as fully as possible with the vexed question of bacterial effluents in relation to disease. My adverse conclusions were based on the results of the experiments that have been set forth in these pages. These results would seem to afford presumptive evidence of the strongest kind, that until positive evidence to the contrary is forthcoming, it would be wise to regard the effluents from bacterial beds as no more safe in their possible relation to disease than crude sewage. Considerable stress was laid on the significance of streptococci in the effluents. Thus it was said that "streptococci are present in abundance in crude sewage, in sewage effluents, and in recently polluted soil and water, but are seemingly absent from pure waters, and even from impure soil and water not recently contaminated with matters of animal outcome. Now, if streptococci as a class are to be thought of as derived from the intestinal evacuations of animals, as delicate germs which readily lose their vitality and die, and as

¹ *Brit. Med. Journ.*, London, August 18, 1900.

not unlikely to be, moreover, pathogenic, the fact that I have repeatedly isolated them from $\frac{1}{1000}$ c.c. or less of the effluents from bacterial beds cannot, I think, be without significance."

In conclusion, I consider that, although the absence of streptococci in an effluent would not necessarily imply the absence of all pathogenic germs of dangerous sort, their presence in any number would go far to show that the biological processes at work in the filter beds were not strongly inimical, if hostile at all, to the vitality of such germs as the typhoid bacillus or the cholera vibrio, which are seemingly more resistant.

It is worth noting that the "streptococcus test" can be applied to any effluent from any system of sewage disposal; whereas, in view of the great difficulties attending the isolation of the typhoid bacillus, even from the stools of enteric patients, and the extremely remote chance of ever demonstrating its presence in raw sewage, search for *B. typhosus* in the effluents from bacterial beds must be regarded as an almost hopeless task, and the failure to isolate it no indication of its real absence.

(m) *The Results of the Bacteriological Examination of Crude Sewage in relation to the Bacterioscopic Analysis of Potable Waters.*

Sewage is the most common and most dangerous source of the pollution of drinking water. Yet our knowledge of the bacterial flora of sewage is by no means as accurate as could be wished. It is believed that the results which have been summarised in this article of the relative abundance of certain microbes in sewage have an important bearing on this subject.

Enumeration of the total number of bacteria, the number of liquefying microbes, and spores of aërobic bacteria may be judged to be of secondary importance, but estimation of the relative abundance of *B. coli* and spores of *B. enteritidis sporogenes* and of streptococci in multiple samples of crude sewage, must be considered of primary import.

Thus, in pure water, I have failed to find spores of *B. enteritidis sporogenes* in as much as 100–500 c.c. *B. coli* is either altogether absent, or present only in insignificant proportion in waters free from suspicion of animal pollution; and I have failed to find streptococci in waters except in cases of recent and objectionable contamination. Yet, as I have shown, raw sewage harbours these objectionable microbes in great abundance. The number of spores of *B. enteritidis sporogenes* is usually at least 100, the number of *B. coli* (or closely allied forms) more than 100,000, and the number of streptococci rarely less than 1000 per c.c.

It is evident from these figures that the smallest trace of sewage gaining access to a water supply could be readily appreciated by the presence of these objectionable microbes.

V. FINAL CONCLUSIONS.—*General*.—When an effluent is turned into a stream to be used for drinking purposes, the bacteriological results are manifestly of more importance than the chemical; but when, as in the present case, the river is not a potable one, and is already polluted, the converse probably holds good; *i.e.* the chemical state of the effluent is of primary, and the biological of secondary importance. In the first case, the chief object is to guard against disease, and in the second case the main consideration is to avoid fouling the river with putrescible matters to such an extent as to constitute a grave public nuisance.

However desirable it may be to obtain an effluent chemically pure, and at the same time bacteriologically above suspicion of danger, a process which (1) leads to the solution of the great mass of suspended matters in the raw sewage, (2) effects a striking reduction in the amount of putrescible matters, (3) avoids the use of chemicals and the accumulation of offensive sludge, (4) yields an apparently non-putrescible effluent, and (5) is at the same time practicable, is one which produces such satisfactory results, in view of all the requirements of the case, that it would be idle to deny its value or attempt to minimise its usefulness simply because it falls short of a standard of absolute perfection.

Biological.—Although the total number of bacteria, the number of spores of aërobic bacteria, and the number of liquefying microbes was, on an average, less in the effluents from the coke beds than in the corresponding samples of crude sewage, the reduction was not well marked, and in some cases the effluents contained more micro-organisms than the sewage before treatment. Thus, while the chemical results were always satisfactory, the bacteriological results were usually quite the reverse, because the microbes producing the chemical changes passed through the coke beds in practically unaltered numbers.

B. coli and *B. enteritidis sporogenes* passed through the bacterial beds in practically undiminished numbers. Thus the effluents usually contained at least 100,000 *B. coli* (or closely allied forms) and 100 spores of *B. enteritidis sporogenes* per c.c.

The effluents contained streptococci (presumably of intestinal origin) in abundance—usually at least 1000 in 1 c.c.

Proteus-like germs were seemingly as numerous in the effluents as in the crude sewage.

B. pyocaneus was isolated from so minute an amount as $\frac{1}{10000}$ c.c. of a Barking coke bed effluent.

“Acid-fast” bacteria were present in considerable numbers in the deposit accumulating on the coke in the bacterial beds. They were also found in the effluents. In one instance a guinea-pig inoculated with the deposit from a bacterial bed (not, however, one at Barking and Crossness), especially rich in these “acid-fast” bacteria, died from tuberculous infection, and sections of its organs,

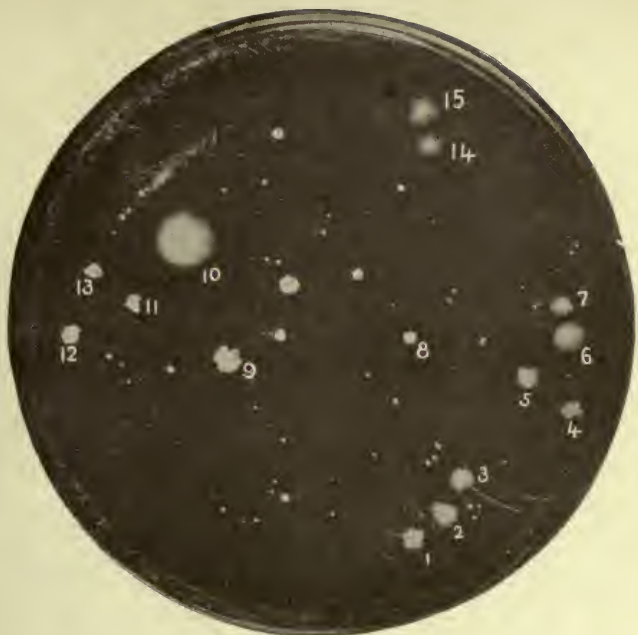


FIG. 2.

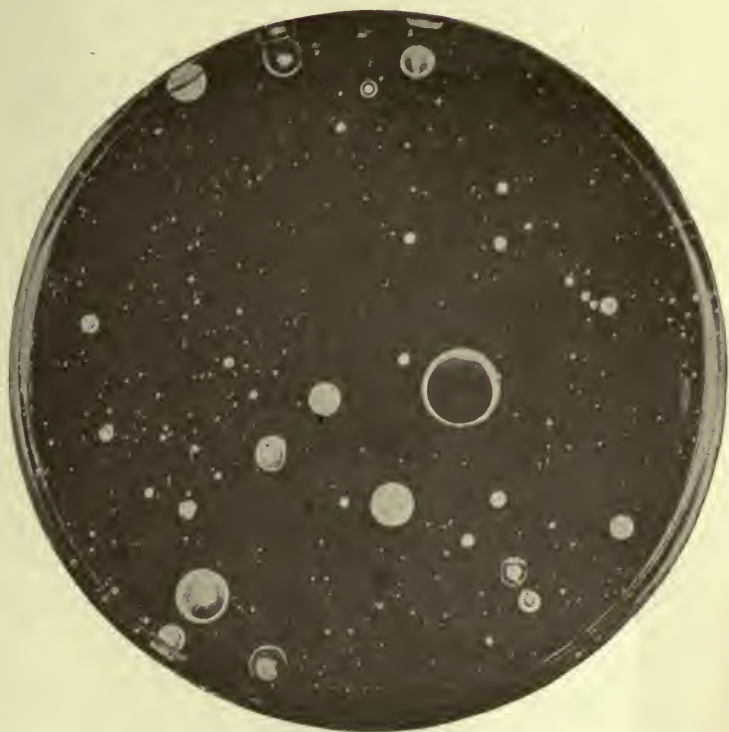
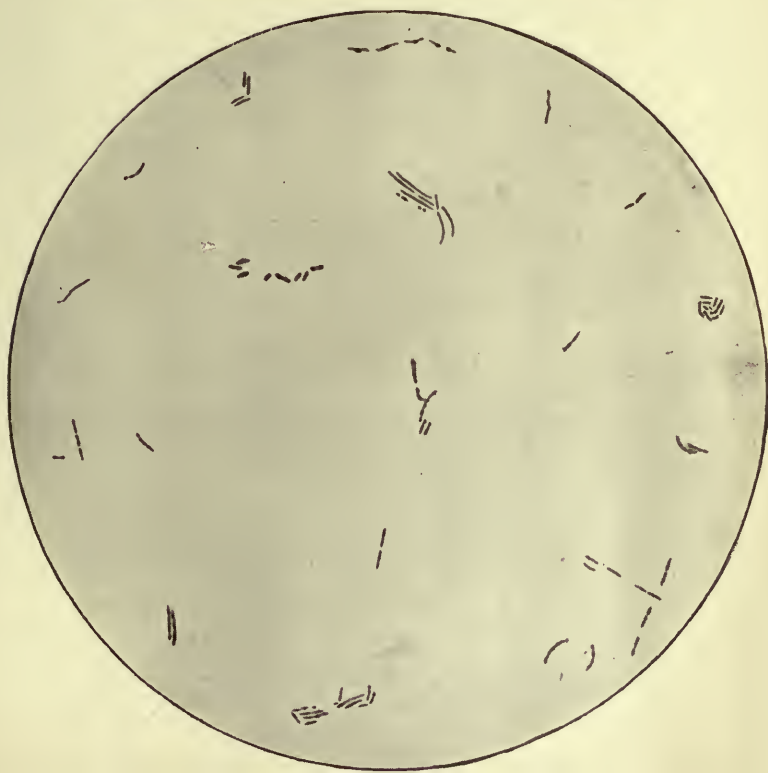


FIG. 1



FIG. 3.



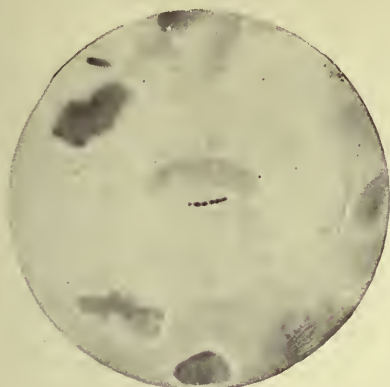


FIG. 5.

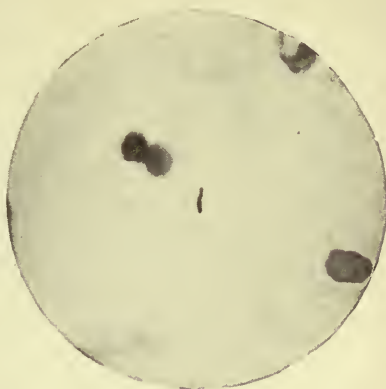


FIG. 6.



FIG. 7.



FIG. 8.



FIG. 9.



FIG. 10.

when appropriately stained, showed the presence of numerous tubercle bacilli.

Two mice, inoculated subcutaneously, each with a small portion of the deposit accumulating on the coke of a bacterial bed at Barking, died of tetanus.

The subcutaneous injection of the effluents from the bacterial beds into guinea-pigs always produced a local reaction and usually death in from twenty-four to seventy-two hours, and the effluents seemed to be nearly if not quite as pathogenic as the raw sewage.

In view of these results, only one conclusion seems possible, namely, that however satisfactory the process may be from the chemical and practical point of view, the effluents from the bacterial beds cannot reasonably be assumed to be more safe in their possible relation to disease than raw sewage.¹

DESCRIPTION OF PLATES VI.-VIII.

FIG. 1.—Gelatin plate culture, containing $\frac{1}{10000}$ c.c. of Crossness crude sewage. (About nat. size.)

FIG. 2.—Surface phenol gelatin plate culture, containing $\frac{1}{100000}$ c.c. of Crossness crude sewage. The colonies (marked 1 to 15 on figure) seemed on macroscopic and microscopic examination to be indistinguishable from *Bacillus coli*. Subcultures of these colonies yielded results as follows: gelatin shake cultures, 1 to 15 inclusive produced gas in twenty-four hours at 20° C.; Litmus milk cultures (38° C.). By the sixth day 6 and 10 strongly acid (6 commencing clot, 10 solid clot); 9 and 11 practically no visible change; 2, 8, 12, and 13 slightly acid; 1, 3, 4, 5, 7, 14, and 15 faintly acid. Broth cultures (38° C.). In twenty-four hours diffuse cloudiness in all the tubes. On the sixth day all the tubes were tested for indol reaction, and all gave a negative result with the exception of 6, which showed a strong indol reaction. (About nat. size.)

FIG. 3.—Showing the changes produced in milk cultures by the growth of *B. enteritidis sporogenes*. The middle tube was inoculated with $\frac{1}{10}$ c.c., and the lateral ones with $\frac{1}{100}$ c.c. of Crossness crude sewage. The tubes were next heated to 80° C. for ten minutes, and then cultivated anaerobically by Buchner's method at a temperature of 37° C. (About nat. size.)

FIG. 4.—From various cover-glass preparations made from Barking and Crossness coke deposits, showing the different shapes and forms of the *acid-fast* bacteria; stained for tubercle. ($\times 1000$.)

FIGS. 5 and 6.—Section of spleen of guinea-pig, died of tuberculosis, after inoculation with some of the deposit accumulating in a bacterial bed; stained for tubercle. ($\times 1500$.)

FIG. 7.—*B. pyocyaneus*. Isolated from $\frac{1}{10000}$ c.c. of the effluent from the secondary coarse bed (series A.) at Barking. ($\times 1000$.)

FIGS. 8, 9, and 10.—Streptococci (X., XIX., XX.) isolated in each case from $\frac{1}{10000}$ c.c., respectively of (a) the effluent from the 6 ft. secondary coke bed at Crossness; (b) the effluent from the primary coarse bed (series A.) at Barking; (c) the effluent from the secondary coarse bed (series A.) at Barking.

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¹ It will be understood that these conclusions are based on the results of the Barking and Crossness experiments; it does not necessarily follow that they have a constant value in the case of all kinds of bacterial filters.

MEDICO-LEGAL NOTES.

By HARVEY LITTLEJOHN, M.B., F.R.C.S.Ed., *Lecturer on Medical Jurisprudence, Surgeons' Hall, Edinburgh.*

EXTENSIVE ATELECTASIS OF THE LUNGS IN A CHILD WHICH LIVED
TWENTY-SIX HOURS.

It is generally held that one or two vigorous respirations of a healthy child after birth are sufficient to produce full expansion of the lungs with air, and thus to cause every portion of them to float when placed in water, and to remain buoyant, even after the application of strong pressure.

Partial expansion of the lungs with air is generally assumed to indicate that respiration was interfered with by some cause during or immediately after birth, or that the child only possessed a very feeble vitality during the time that it lived. It may be generally affirmed that the less the amount of lung tissue giving evidence of buoyancy in water, the less is the probability of the child having survived its birth for any length of time. Where a newly-born child is found dead, and the mother is suspected of infanticide, this is a fair conclusion to draw, in the absence of clear proof to the contrary, but it would be a great mistake to regard such a conclusion as absolutely correct in all cases. It is well known that not only may very partial expansion and buoyancy of the lungs be consistent with the survival of a child for a considerable period of time, but also that the hydrostatic test may afford wholly negative results, and the lungs retain a perfectly foetal appearance, in cases where respiration has continued for several hours.

The hydrostatic test, therefore, is not an absolute means of determining that respiration has taken place, since in those exceptional cases of persistent atelectasis it may afford negative results, and yet the child may have respired for a considerable time. Such cases do not, however, materially diminish the value of the evidence derived from the test in charges of infanticide, since in all cases in which very partial expansion of the lungs is present, the prisoner is given the benefit of the doubt, and it is assumed (unless there is clear evidence to the contrary) either that the child was not "born alive" in the legal sense, that is to say, had not a separate existence after complete delivery, or that it died immediately after birth from some natural or accidental cause.

The following case demonstrates how incorrect such an assumption may be, and what slight changes may be present in the lungs, even after respiration has been maintained for a period of twenty-six hours:—

The mother was a primipara, and the labour lasted about eighteen and a half hours, namely, the first stage fifteen and a half hours; the

second, three hours, after which delivery was completed by the aid of forceps.

The child cried at birth, and also several times, although feebly, during the following twenty-four hours. It appeared weak and somewhat immature, and therefore was placed in an incubator, in which it seemed to be doing well, until, at the end of twenty-six hours, a convulsive seizure came on, and death supervened.

The post-mortem examination was made on the following day. Weight, $4\frac{1}{2}$ lb.; length, $17\frac{1}{2}$ in.; body well developed; slight icterus; head well covered with hair; nails projecting beyond the finger-tips, but scarcely reaching to the ends of the toes; the right testicle well down in the scrotum, the left at the lower end of the inguinal canal; no ossific node at the end of the femur; the attached portion of the umbilical cord was mummified. On removing the sternum and anterior wall of the chest, only the heart and thymus gland were displayed to view; the pleural cavities appeared to be empty, both lungs being small and hidden from sight. On the posterior surface of the left ventricle of the heart, on the aorta, and along the coronary sinus, there were numerous small extravasations of blood. Both ventricles were firm and contracted; the auricles were distended with dark, coagulated blood. On removing the heart, thymus gland, and both lungs, *en masse*, and on placing them in water while still connected together, they sank at once. On testing the buoyancy of the *right* lung, it just managed to keep at the surface. The anterior borders of the upper and middle lobes were of a light pink colour, "marbled" on the surface, rounded from distension of air cells, although not uniformly, but merely in patches of small extent. A light patch also showed itself at the upper corner of the anterior border of the lowest lobe. With these exceptions, the lung presented an absolutely fetal appearance. On section, some froth and dark fluid blood escaped from the cut tissues, which presented a uniform deep red and dense appearance, except at the surface of the anterior portions of the upper and middle lobes, where to a depth of $\frac{1}{8}$ in. the lung was of a light pink colour, and was thus sharply defined from the darker lung tissue beneath. On cutting into the lowest lobe, it presented a solid consistency and dark-coloured appearance, with some froth in the larger air tubes. The upper and middle lobes floated when placed separately in water, the lower lobe sank at once. The *left* lung sank in water, as did also each of its lobes when separated. A small portion of the anterior border of the upper lobe was slightly rounded and of a lighter colour than the rest of the lung, which was otherwise uniformly dark and of firm consistence. On section, some frothy fluid escaped from the air tubes of the upper lobe.

The various lobes of both lungs were now divided, consecutively, into pieces and placed in water, in order to test their buoyancy. Each piece which floated was then subjected to pressure, and the results are shown in the following table:—

Right lung.—Upper lobe, divided into eight pieces, three floated, all sank on pressure. Middle lobe, divided into eight pieces, seven floated, two sank on pressure. Lower lobe, divided into twelve pieces, one floated, but sank on pressure.

Left lung.—Upper lobe, divided into eight pieces, two floated, and both sank on pressure. Lower lobe, divided into ten pieces, none floated.

The larynx and trachea contained a little froth; the mucous membrane was injected. The liver showed on its upper and lower surfaces numerous extravasations of blood, which in some parts extended to a considerable size. Its structure appeared to be normal.

The spleen was firm and healthy in appearance. The kidneys showed uric acid infarction of the straight tubules; the bladder also contained a quantity of yellow uric acid sediment.

The stomach contents consisted of tenacious mucus of a whitish colour, which on microscopic examination showed fat globules and colostrum corpuscles. The stomach floated when placed in water before being opened.

The upper part of the small intestine was distended with air for a considerable distance, but contained no other contents. The rest of the small intestine was empty, and collapsed. The whole of the large intestine, including the cæcum and appendix, were full of meconium.

There was a well-marked caput succedaneum in the left parietal and temporal region, and on reflecting the scalp the tissues here were found suffused with blood. The left parietal bone was fractured, the fracture running from the sagittal suture to the parietal eminence. The right parietal bone was fractured in two places, one fracture being in a similar position to that on the opposite side, and the other running from the fronto-parietal suture horizontally towards the eminence. There was also a fracture of the upper part of the left frontal bone. These fractures showed well-marked effusion of blood around the edges. The various cranial bones were well ossified at the sites of fracture.

There was a large meningeal extravasation of blood extending over the greater part of the left hemisphere of the brain.

From the above account it will be seen how slight were the changes produced in the lungs by respiration. Of the forty-six pieces into which they were divided, only thirteen floated, and of these, again, all except five pieces sank on the application of pressure. This latter fact indicates that the other pieces, which at first floated, could only have been very imperfectly distended, since no amount of pressure, short of destruction of the lung tissue, will drive the air out of a portion of fully expanded lung.

It is stated that respiration during the twenty-six hours of life was comparatively feeble, but still there is the fact that the child cried several times, both immediately after birth and also subsequently, so that the very slight evidence of the entrance of air into the lungs must be regarded as a remarkable circumstance.

The imperfect respiration cannot well be attributed to immaturity, since, judging from the length of the body, the condition of the nails, hair, and position of the testicles, it may be assumed that the child had almost certainly reached the thirty-sixth week of development, an age which is, as a rule, quite consistent with vigorous respiration. In all probability, therefore,

the feebleness of the respiratory function was due to the injuries caused to the skull and brain during delivery. In such a condition of depressed vitality a comparatively small quantity of oxygen might suffice to maintain life for a considerable time, and hence the slight evidence afforded of the entrance of air into the lungs, although remarkable, must be deemed quite consistent with the fact of life having been maintained for the period mentioned. It must also be remembered that a certain amount of respiration, that is to say, oxygenation of the blood, may take place through the mucous membrane of the air passages. This fact explains the undoubted cases which have been recorded of children living and breathing for a considerable time after birth without any indication of air having entered the air vesicles being found after death, the lungs remaining in a totally atelectic condition. That such bronchial respiration took place, to some extent, in the present instance, was indicated by presence of froth in the air tubules of portions of the lungs, which showed no signs of the entrance of air into the air vesicles, and which otherwise presented a perfectly foetal appearance.

A striking contrast in some respects to the above case was afforded by the examination of an infant which was born in the Maternity Hospital:—

The mother was a small, healthy woman, æt. 17, and when she arrived in the hospital the head of the child was stated to have been already born. It was placed in an incubator, and lived for two days, when it died, apparently from inanition.

The following were the results of the post-mortem examination:—Weight, $2\frac{1}{2}$ lb.; length, 16 in.; body well nourished; limbs plump; head well covered with hair; remains of the pupillary membrane present in both eyes; nails reached almost to the ends of the fingers. The labia minora prominent, and uncovered by the labia majora; no ossific node at the end of the femur; the remains of the umbilical cord mummified, and showing a distinct line of demarcation.

On examining the chest, the lungs were seen to fill both pleural cavities, and they overlapped to some extent the pericardial sac in front. They were light in colour, “marbled,” fully distended, and crepitant throughout. On placing them in water, along with the heart and thymus gland, they floated buoyantly. Each lung floated as a whole, and after being divided up into numerous small pieces, and every portion continued to float after the application of firm pressure.

The stomach contained a little air, blood-stained mucus, and some milk; the small intestine was collapsed and empty; the large intestine was also empty, containing no meconium. Both kidneys showed uric acid infarction of the straight tubules. There was a slightly marked caput succedaneum; the brain presented a normal appearance.

The interest in this case lies in the fact that complete expansion of the lungs took place in such an immature and feeble child, and also in the contrast which it thus offers to the previous case. Both

children passed the period in which they survived, under the same conditions, namely, in incubators; and both were of feeble vitality, showing little difference in this respect, except perhaps in the fact that the first child cried several times, whereas the other was not known to cry at all. Notwithstanding these points of similarity, on examining the bodies after death, in the first case the lungs were found almost completely atelectic, while in the latter every portion of them was fully distended with air. Facts such as these must impress upon us the necessity for extreme caution in expressing opinions as to the probable duration of life in newly-born children, based merely upon the amount of expansion of the lungs produced by respiration, and the evidence of this afforded by the hydrostatic test.

FINGER-NAIL ABRASIONS ON THE NECK OF A NEWLY-BORN CHILD:
WERE THEY THE RESULT OF AN ATTEMPT AT SELF-DELIVERY
OR OF HOMICIDAL STRANGULATION?

The dead body of a newly-born child was discovered among the personal effects of a woman who was suspected to have given birth to it on the previous day. On examination of the body, its weight was found to be $4\frac{1}{2}$ lb., and the length 18 in. It was well formed; the head well covered with hair; the nails projecting beyond the ends of the fingers; both testicles were descended into the scrotum; and the child, although poorly nourished, was apparently mature. There was, however, no ossific node at the end of the femur. The umbilical cord had been torn, leaving a portion, $6\frac{1}{2}$ in. long, attached to the body. There was no caput succedaneum. The lips and nails were livid; the conjunctivæ were injected, but showed no petechial ecchymoses.

On the front of the neck, to the left side of the larynx, there was a curved abrasion, $\frac{3}{4}$ in. long, the concave surface being anterior; on the right side of the neck, at a slightly lower level, were two similar abrasions, $\frac{1}{2}$ in. apart from each other. On the neck behind, to the left side of the spinal column, and about the level of the first dorsal vertebra, there were two wounds of the skin, separated about 1 in. from each other, and curved in form, the concavities being directed upwards and towards the right side. These wounds were less in length, but deeper than the abrasions on the front of the neck, and they showed in addition ecchymosis or extravasation of blood into the surrounding and deeper layers of skin. All these wounds bore a very strong resemblance in form and in size to injuries produced by finger-nails. There were no other marks of violence upon the body.

On the posterior surface of the heart, and also on the surface of both lungs, there were several petechial ecchymoses or small extravasations of blood. The right side of the heart was distended with dark fluid blood. The lungs were of a light red colour, presented a "marbled" appearance, and were fully distended and crepitant in every part. On applying the hydrostatic test, they floated as a whole, and also when divided into numerous small pieces. No portion sank even after the application of firm pressure.

The stomach floated, and, on opening it, was found to contain frothy mucus. The larynx and trachea contained some froth; there were no effusions of blood, or injuries detected in the parts situated beneath the skin of the neck. The other organs of the body presented a normal appearance.

The abrasions on the neck at once struck the most casual observer as being suspicious, and strongly suggestive of marks produced by finger-nails, and there can be little doubt that they were caused by the neck having been violently grasped and compressed. The size of the marks pointed to the thumb having been placed in front and the fingers on the neck behind, while their form and the direction of the curvatures indicated that, in all probability, they had been produced by the left hand.

From what has been stated in the results of the post-mortem examination, it is evident that the child, although not fully mature, yet had arrived within two or three weeks of this stage of development, and that it was quite capable of maintaining a separate existence. It is equally certain, as was indicated by the signs of respiration, that the child was living at the time of its birth.

The question of chief importance and difficulty which the medical examiner had to decide, was as to the cause of death and the manner in which the marks on the neck were produced.

The post-mortem examination showed that death had resulted from asphyxia, for which no apparent cause existed in the body, and hence it is impossible to dissociate the marks of violence from being directly concerned in producing this result.

There are two theories which might be urged in explanation—the first, that which would be put forward for the defence, namely, that the mother, in an attempt at self-delivery, had seized the neck, and thus accidentally caused the death of the child; or, secondly, that death had resulted from manual strangulation, after the child had been completely delivered.

With regard to the first proposition, however plausible it may appear, yet I think it cannot be substantiated by the facts of the case. It must be borne in mind that the child had evidently exercised full and free respiration. This is indicated by the complete distension and aeration of both lungs, and it is an accepted maxim in medical jurisprudence that such full expansion and aeration can only take place after complete delivery, and with free, unimpeded respiration.

A child may undoubtedly draw air into its lungs, while its body is still wholly contained within the maternal passages, and more especially if the head has been already born, but such respiration is always limited, and never produces full expansion of the lungs. On the other hand, one or two vigorous respirations, after completed birth, may be sufficient to render both lungs distended and buoyant in every part.

A second consideration in connection with a theory of

attempted self-delivery is the absence of a caput succedaneum, or other indication that the labour was prolonged. It is quite possible to conceive that a woman giving birth to a child, while alone and unassisted, may, when either impelled by excitement or with a desire to end her suffering, seize the neck of the child, the birth of which was for some reason retarded after protrusion of the head. That she should, however, make such an attempt where the birth was easy and rapid, is most improbable; and hence, in cases where injuries are found on the neck and attributed to such a cause, corroborative evidence pointing to a difficult or retarded labour should be present. *A fortiori*, also, under these latter circumstances, evidence of the child having respired so as to cause complete expansion of the lungs will be absent.

On these two grounds, therefore, namely, the evidence of full and free respiration having taken place, and the fact that the examination indicated an easy and rapid labour, the theory that death resulted accidentally cannot be entertained.

Attention has been directed by Fritsch and others to a distinction between marks produced during attempted self-delivery and those resulting from manual strangulation, namely, stress is laid upon the circumstance that the mother, in a case where the birth is delayed after protrusion of the head, is unable to grasp the neck easily, and is much more likely to lay hold of the face. Where, therefore, the face shows no indications of injury, and the marks are confined to the neck, this fact contra-indicates their production during an attempt at self-delivery.

The position and form of such marks on the neck may also strongly negative a theory of self-delivery, as in one case in which Strassmann found the concavities of the nail marks directed downwards, and therefore gave an opinion against the suggestion that they had been produced by the mother in trying to expedite the birth.

The only conclusion which the circumstances entitle us to arrive at is, that the child died as a result of manual strangulation, after it had been completely born, and therefore that the case was one of deliberate infanticide.

CHOLESTEATOMA OF THE TEMPORAL BONE AND ITS TREATMENT.

By H. J. WARING, M.S., F.R.C.S., *Surgeon to the Metropolitan Hospital; and Surgical Registrar and Demonstrator of Practical and Operative Surgery, St. Bartholomew's Hospital, London.*

A CHOLESTEATOMA of the temporal bone is a tumour composed of a large mass of epithelial cells, squamous in character. The swelling is localised, and generally has the form of an oval-shaped

growth situated in the interior of the temporal bone, either in connection with the mastoid cells, the mastoid antrum, or the tympanic attic.

The tympanic cavity, the mastoid antrum, and the mastoid cells are lined by mucous membrane, the cells of which are cubical or columnar in shape.

Cholesteatomata of the temporal bone are said to be either primary or secondary in their origin. The first group comprises those cases in which the tumour is supposed to be derived from the epithelium of a cul-de-sac which extends from the lining membrane of the deeper portion of the external auditory canal towards the mastoid antrum and the tympanic cavity. A track or canal of this kind has been shown to be present in a small percentage of patients who have been examined from this point of view by Politzer and Schwartze. Another possible origin of a primary tumour is from a portion of surface epithelium which has become included during the process of development of the middle ear and external auditory meatus.

The second group comprises those cases of cholesteatoma which develop in association with long-continued suppuration of the middle ear and partial destruction of the tympanic membrane. Squamous-celled epithelium then grows into the interior of the tympanic cavity through the aperture in the membrane, and covers the inner wall of this space. Thence it extends backwards through the aperture in the posterior wall of the tympanic cavity to the interior of the mastoid antrum, the mastoid cells, or the attic of the tympanum. From a portion of this ingrowing epithelium, by excessive and continued growth, a cholesteatomatous tumour may take its origin.

The majority of tumours of the middle ear and the temporal bone which have the structure of a cholesteatoma, take their origin from epithelium which has grown inwards to the mastoid cells and antrum, after a portion of the tympanic membrane has been destroyed in connection with suppurative otitis media of the affected side, and only a few may be classed as primary tumours, which take their origin according to one of the methods described above.

The following two clinical records are illustrative of the two groups of cases, and, owing to certain points in connection with the treatment adopted, they appear to be worthy of recording:—

CASE 1.—*Cholesteatoma of the temporal bone, primary.*—A healthy looking young married woman, æt. 22, sought treatment on account of the development of a painful swelling behind the external auricle of the left side. She stated that she had been somewhat deaf on the left side for a considerable time, and that three weeks previously a swelling commenced to form behind the left ear. This increased in size, and became painful, especially on manipulation. The patient also gave a somewhat indefinite history of the occurrence of rigors. There was no evidence of

the existence of a purulent discharge from the external auditory meatus on the affected side. When she was examined, a fluctuating swelling was found situated behind the left auricle, which extended backwards over the base of the mastoid process. An incision was made into this swelling, and a quantity of purulent matter evacuated. The bone of the mastoid process was said to be exposed after the collection of pus had evacuated. The patient was much relieved by the procedure.

Three weeks later the patient came under my observation. She then had a small fistulous aperture behind the external auricle, which, on examining with a probe, was found to have carious bone at the bottom. The diagnosis was made that the patient was suffering from a mastoid fistula, caused by necrosis of a part of the mastoid process. There was no discharge from the external auditory meatus, and at this time the membrana tympani was intact, although the tympanic cavity appeared to be partially filled by a collection of opaque material. It was decided to explore the mastoid antrum and cells through an incision in the posterior auricular region. A free semilunar incision was made in the mastoid region parallel with the posterior margin of the external auricle, and the bone laid bare. This was found to be carious and necrotic. The external layer of bone was removed with a chisel, and a large cavity was opened, which was filled with tumour-like firm material. This was removed with a Volkmann's spoon. When this had been done completely, the interior of the mastoid process and the petrous portion of the temporal bone were found to be occupied by a cavity having thin bony walls. This space was oval in shape, and measured a little over 2 in. in its long diameter, and about $1\frac{1}{4}$ in. in the other. The petrous portion of the bone appeared to have been bulged backwards towards the cerebellar fossa, and forwards towards the tympanic cavity, and upwards in the direction of the floor of the middle cerebral fossa. The tympanic cavity was mainly obliterated by the extension of the space forwards, but the cerebral and the cerebellar fossæ were not found to directly communicate with the cholesteatomatous space. The entire space was freed as far as possible from all traces of tumour-like tissue, and the tympanic cavity also scraped after being made to communicate with the above-mentioned cavity. When this had been done, the interior of the cavity was irrigated with an antiseptic solution, and then packed with gauze. This method of treatment, by irrigation and packing, was continued for several weeks. The walls of the cavity were then found to be lined with red granulations. A purulent discharge was now noticed to exude from the external auditory meatus, and on investigation a perforation and partial destruction of the membrana tympani was diagnosed.

The cavity from this time became more or less stationary in size, and did not appear to show any sign of filling up in its deeper portions. Cultivations from the discharge from the space showed a growth of *Staphylococcus pyogenes albus* and other pus cocci. More frequent and prolonged irrigation was then practised with antiseptic fluids, until the cavity became quite sterile, when bacteriological cultivations were made from the slight discharge which existed. A further operation was now carried out for the closure of the space. The wound behind the external auricle was opened up, the interior of the cavity within the

temporal bone carefully sponged dry with small pieces of marine sponge, and the entire space was filled with long thin strips of bone and cartilage, which were taken from the femora and tibiae of a young kitten, killed for the purpose, during the course of the operation. When this had been done, the external wound was closed by sutures, and the external auditory meatus plugged with a strip of antiseptic gauze. After the operation the patient did well, and beyond a foul-smelling non-septic discharge from the external meatus, from the fifth to the ninth days, nothing of importance occurred. The patient left the hospital a fortnight later. The sinus was then quite healed, and there was practically no discharge from the external auditory meatus. The hearing was slightly improved on the affected side, but not to any marked extent. This patient was seen at short intervals for twelve months after the operation, and continued quite well. She was last seen two years after the operation had been performed, and was then quite well. The tumour, when examined histologically, was found to have the typical structure of a cholesteatoma.

CASE 2.—*Cholesteatoma of the temporal bone, secondary.*—A healthy looking girl, æt. 10, came under observation on account of the presence of a persistent purulent discharge from the right external auditory meatus. She stated that for two years she had suffered from this condition, and eight months previously she had been submitted to an operation at another hospital. The exact nature of this proceeding could not be ascertained, but from the appearance of the mastoid region on the affected side, it seemed probable that some form of scraping or erosion of the mastoid cells and antrum had been carried out. On examination, a purulent discharge was seen to exude from the external auditory meatus, whilst the deeper part of the canal was partially filled by polypoid masses of growth. The membrana tympani, as far as could be made out, was in the main destroyed. The auditory ossicles could not be seen. Behind the right auricle in the mastoid region a depressed scar was visible. The patient was somewhat drowsy and stupid, whilst the temperature was raised. There was no definite evidence of extension of the disease to the lateral sinus, the internal jugular vein, or the interior of the cranium, beyond the drowsiness already mentioned.

The patient was anæsthetised, and the region of the tympanic cavity and the mastoid process carefully examined. The tympanic cavity was found to be filled with a vascular tumour, and the surrounding bone was in places felt to be bare and carious. With the aid of a small Volkmann's spoon the entire tumour was removed, and the walls of the cavity in which it was situated scraped. The tumour appeared to extend mainly backwards towards the mastoid process and the mastoid antrum. When this had been done, irrigation was performed with an antiseptic solution, and the entire space carefully packed with a long strip of aseptic gauze. This method of treatment was carried out twice daily for several weeks. The cavity diminished in size, and the discharge almost ceased. The patient was then discharged. The portions of tumour which were removed consisted of vascular tissue, covered with a large amount of stratified squamous epithelial cells.

A few weeks later the patient returned, her condition then being similar to when she first came under observation.

A second operation was now performed. The mastoid region was exposed, and after the removal of a quantity of hard dense bone the position of the cavity of the mastoid antrum was opened up. No trace of the spaces of the mastoid cells were met with during the procedure. The cavity representing the tympanic cavity and the mastoid antrum was then cleared of a quantity of tumour, and its walls scraped. A small quantity of carious bone was found in the mastoid process. This was removed during the operation. The cavity was then packed from behind and the posterior auricular incision left open. An attempt was made to render the cavity aseptic, with the object of then filling up the space with strips of bone. Considerable difficulty, however, was experienced in this direction, owing to the fact that the space again became filled with the cholesteatomatous growth. Three further operations were performed similar to the preceding one, before this object was accomplished. When the cavity had thus been made aseptic, it was again laid freely open from behind the auricle, and the interior packed with strips of bone taken from the femur of a young kitten, similar to the method described in connection with Case 1. The effects of this proceeding, however, were unsatisfactory, a purulent discharge commencing a few days later, and the fragments of bone being discharged through the external auditory meatus and the wound in the mastoid region.

The patient was discharged for a time, and told to return a few weeks later. The operation described by Mr. Ballance was then performed. A moderately good result followed; the large cavity becoming lined with epithelium.

The first case in its symptoms and pathology very much resembles the case of primary cholesteatoma which has been described by Kuhn. This occurred in a male patient, *æt.* 51 years. He had suffered from tinnitus in the left ear for several years previously, and occasional attacks of giddiness and deafness. After a severe catarrhal affection of the nose, an acute attack of suppurative otitis media was followed by a purulent discharge from the external auditory meatus, and the development of a mastoid abscess occurred. An operation was performed, when, after removal of the superficial bone in the mastoid region of the left side, a large cavity, oval in shape and about the size of a hen's egg, was found to occupy the interior of the temporal bone, which was completely filled with a cholesteatomatous tumour. After this tumour had been removed, the lateral lobe of the cerebellum and the lateral sinus were exposed, owing to the absorption of the posterior and internal wall of the osseous tympanum.

The treatment which was adopted in my case was followed by such an excellent result, that I think it would be advisable to attempt a similar procedure in cases of primary cholesteatoma which may come under observation. The chief difficulty in connection with the operation is rendering the cavity aseptic, after the tumour formation has been removed. In my case I made use of irrigation with a solution of bi-iodide of mercury. Recently, however, in some cases of suppurative otitis media I

have obtained excellent results by the use of irrigation with a solution of formalin. The active antiseptic in this substance is volatile, and appears more easily to render the tympanic cavity and its adjacent spaces aseptic. As regards the second case, this is undoubtedly one of so-called secondary cholesteatoma, which had developed in connection with long-standing suppurative otitis media. The reason of the failure of the bone grafting was, I think, due to the fact that the space was never rendered thoroughly aseptic. When further opportunities occur, I propose to attempt a similar operation after having rendered the space aseptic by repeated irrigation with a solution of formalin.

The after-condition of the patient appears to me to be better when the space within the mastoid process is filled up by a growth of new bone, than when it is left as a hollow cavity lined with epithelium, such as is the case in the second patient above described.

In children, I think it may be possible in favourable cases to perform a partial resection of the superficial portion of the posterior part of the mastoid process, and to move it forwards, so as to fill the cavity with a fragment of bone which still retains a portion of its blood supply. The results of this form of operation I hope to be able to record in a later paper.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

Thomas Sydenham. By JOSEPH FRANK PAYNE, M.D. (Oxon.), Fellow and Harveian Librarian of the Royal College of Physicians. London: T. Fisher Unwin. 1900.

SYDENHAM introduced a careful observation of nature and facts which changed the whole face of medicine. In this terse sentence John Richard Green sums up the benefits which have accrued to the art of healing through the influence of "the prince of practical physicians," as Dr. John Brown designates him in his charming essay on "Locke and Sydenham." The times were favourable for a revolution of this kind. England, weary of strife, glad to escape from the austerity and gloom of the Protectorate, too readily perhaps lent herself to the freedom and licence of the Restoration. But the check on progress was followed by a rebound from which science, literature, and art alike profited. It is therefore imperative that those interested in the history of leechcraft should be informed of what has come down to us concerning one whose methods formed the foundation of those pursued at the present day, and after whom two societies in succession, devoted to the preservation and advancement of medical lore, have been named. His biographer, Dr. Payne, is known as one of the most able and thoughtful, as he is one of the best read of the physicians of our era, and from his capable pen we have in a book of convenient size, an appreciative record of Sydenham's career.

Though information on many points is meagre, and conjecture has to be resorted to in the endeavour to elucidate doubtful bearings, yet the publications of the Record Office have thrown light on personal history in the 17th century, and these have been utilised for the first time with corresponding advantage. His name is essentially an English one, and the house in Wynford Eagle in Dorset, where he was born in 1624, still remains scarcely, at least externally, altered. Most of the county families there were Puritan, and sided with the Parliament, and this circumstance had its effect in moulding Sydenham's bent. His boyhood was passed under the care of a conscientious father, a pious mother, and in the company of manly elder brothers, who in time held commissions in Cromwell's army. Not, however, till he entered Magdalen Hall, Oxford, as a Fellow Commoner, do we hear anything directly of Thomas. His studies there were early interrupted by the course of political events. He served with the colours against the King, and only when the

embers of the first Civil War had died out did he return to Oxford, and soon after was "created" a Bachelor of Medicine, though his training must necessarily have been scanty, as he had then barely resided a year in the university. He may have enlarged his knowledge during several years spent as a Fellow of All Souls' College, and the opportunities he had are set forth in a sketch of Oxford under Puritan rule, to which some space is devoted. His military services were not yet concluded, for in 1651, and for at least six months, he was captain of a company of militia, and through this he succeeded in obtaining such compensation, in the form of arrears of pay, due to a deceased elder brother, that he was able to marry and settle down in practice in London. It was while there that the great epidemic of plague occurred; and though he for a time continued his professional duties, he eventually, for reasons probably prudential, absented himself. When he did return the scourge was on the wane, the cases were of a milder type, and the contribution which he made to its literature is not his most valuable. He obtained not merely a fair practice, but his reputation was widespread, so much so that Dr. Andrew Brown of Dolphinton travelled to London expressly to visit him and see his modes of treatment. Seizures of gout, and latterly attacks of calculus, at times necessitated cessation of work, and finally grew frequent, and he died in 1689. The reproduction of the portrait by Mary Beale, which forms the frontispiece, gives the impression of a kindly, gentle man, somewhat grave in aspect, but with a degree of firmness about the mouth.

If there are lacunæ in the details of his life which one would rather have filled from accurate knowledge than from inference, when we turn to his writings we are on more solid ground. The magic power of character dies with the man, the force of tradition fades in a generation or less, and the ripple on the mobile surface of human nature which we trace to his influence for good or evil insensibly grows fainter as it widens out; but his works live, and preserve more or less of his actual individuality to future generations. Indeed, they may have a greater measure of success than their originator had in his lifetime. In judging of Sydenham's views we must not forget the errors and prejudices which surrounded him, how extensively theoretical considerations prevailed, and what great reliance was placed on silly or even harmful nostrums. This is fully discussed in an interesting chapter on medical practice in Sydenham's time. The advance he initiated sprang from the principles he enunciated, the necessity for a careful personal observation and collation of facts on which alone our inductions must be built, and the establishment of a rational method of treatment. He was courageous in withholding remedies when he judged them superfluous or uncalled for. If his class of fevers seems to our ideas too extensive an one, we must remember that most of the local causes of pyrexia were then unrecognised; if he lays too much stress on season and particular years in affecting the type and calling for modifications of treatment, we should bear in mind that there were several epidemics of influenza in his period, and its vagaries must have puzzled him quite as much as they do the physicians of ours. Payne analyses the question of the language in which Sydenham wrote; his classical reading was, we know, very considerable, but that does not prove that he could write in Latin with

equal fluency, and it is probably correct to conclude that what he composed in English was rendered into Latin by another hand. In drawing this notice to a close, we feel sure that in recommending this volume of the series of "Masters of Medicine" to our medical friends, they will find its perusal an agreeable and profitable way of spending their hours of leisure.

W. ALLAN JAMIESON.

Diseases of the Tongue. By H. T. BUTLIN, F.R.C.S., D.C.L., and WALTER G. SPENCER, M.S., M.B. (Lond.), F.R.C.S. London: Cassell & Co. Limited.

THIS book, although really a second edition, the first having been written by Mr. Butlin alone fifteen years ago, must be regarded as a new work. It is an admirable monograph on the subject of diseases of the tongue, in which even the rarest are dealt with in detail. The index and bibliography at the end of the book are the best of their kind we have seen; by means of them it is easy for the reader to find information on any subject, however minute, relating to the surgical diseases of the tongue. It is disappointing to find that our knowledge alike of the pathology and treatment of several seems to have made little or no progress in the last twenty years. Take for example "wandering rash," or herpes of the tongue, or acute glossitis: there is a long description of each to be found in this book, but the reader will come to the conclusion that practically nothing is yet known as to their causes, and that our forefathers were quite as well able to treat them as we are. Indeed, the authors have endorsed some old-fashioned methods of treatment which might very well have been allowed to pass into obscurity; for instance, cases of acute glossitis "are treated by the application of blisters to the floor of the mouth" (p. 69). The obvious meaning of this direction is that the practitioner is to paint blistering fluid on the mucous membrane under the tongue; fortunately, the swelling of this organ in acute glossitis would render such a barbarous and useless proceeding impossible. If, on the other hand, the authors intend that the skin under the chin should be freely blistered, we venture to doubt whether either of them believes that the patient's discomfort would be thereby decreased or the course of the disease affected, except for the worse. In their anxiety to do justice to other writers, the authors have, in several other places, retained methods of treatment, etc., which might well have been forgotten. With regard to the very important subject of the methods of removing the tongue for cancer, the description of some, such as involve complete division of the lower jaw, which is hardly ever necessary and which greatly adds to the risk, might have been relegated to a foot-note. It is indeed somewhat difficult for the reader to decide which form of operation for cancer of the tongue is considered the best by the authors, and we think that many surgeons will be surprised at that finally recommended as the routine one.

Two views have come into wide acceptance during the last twenty years, on the subject of operations for cancer of the tongue—first, that a clean excision is greatly preferable to the use of the ecraseur; and, secondly, that the chief danger lies in secondary deposits in the glands of the neck.

We should like to add, though it is contrary to the teaching of the present work, that preliminary ligature of the lingual arteries in the submaxillary triangles renders excision of the tongue by Whitehead's method, *i.e.* the use of the scissors, both simpler and safer.

The trouble experienced sometimes from hæmorrhage, without such preliminary ligature, is made very light of by the authors, who recommend that half or the whole tongue should be excised as the first operation, and some three or four weeks later the submaxillary gland and the neighbouring lymphatic glands should also be excised as a second operation. It may be noted that in speaking of the latter the authors use the somewhat incorrect term, "removal of the contents of the anterior triangle." It is difficult to believe that this division of the operation into two stages will be generally followed, and the reasons for it given by the authors do not seem convincing. Against it may be urged the following points:—(1) The submaxillary gland, on one or both sides, together with all the neighbouring lymphatic glands that can be found, may be conveniently excised, and the lingual arteries tied, as the first step of the operation, and one which (as Mr. Butlin says) takes considerable time, and must not be hurried, but the subsequent almost bloodless excision of the cancerous tongue is reduced to a very simple procedure, one which is over in a few minutes. (2) As a matter of experience, these cases as a rule do extremely well, the neck wounds hardly ever giving trouble, provided all divided vessels have been carefully ligatured, and temporary drainage provided for. (3) It is well known how reluctant patients are to consent to such a mutilation as removal of the tongue, and their reluctance must be increased on learning that it involves the shock and, with private patients, the additional expense of two major operations (at a short interval) instead of only one.

One of the best chapters in the book is the first, on "The Anatomy and Physiology of the Tongue," by Mr. Spencer. It may, however, be suggested that in a future edition this chapter should be made less concise; at present it affords very arduous reading. Another point in which great improvement might be made is the coloured illustrations. All these are exactly the same as were used for the first edition, a much smaller and cheaper book; three drawings (each only about half the natural size) are crowded on to one page, from which results a necessary loss of detail and artistic effect.

The representation of a particular disease is often widely separated from the letterpress describing that disease; thus, "wandering rash" is described on p. 94, whilst its drawing faces p. 160; lupus of the tongue is described on p. 170, and illustrated on p. 96.

Whilst some of the chromo-lithographs are, allowing for their inadequate size, fairly good representations, it must be admitted that several are extremely bad, and one has only to compare them with the coloured plates which illustrate many recent books, to see that this statement is in no way exaggerated.

It is not merely that the execution of such plates as *iii.* and *viii.* is crude and poor, but some of the colours employed are quite inappropriate. Shades of green are used alike for the lips, tongue, and teeth, whilst deep red and purple tints are employed in an extravagant and unnatural

manner. It would be well that the plates, in Wordsworth's words, should

"Take a sober colouring from an eye
That hath kept watch o'er man's mortality."

We invite the authors' attention to this point; the book is so good that it deserves to be well illustrated, and few diseases lend themselves so well to pictorial representation as those of the tongue. The coloured plates in the present work are far from being speaking likenesses.

To the general excellence of the letterpress we have already alluded. It may be noted that the value of solutions of chromic acid in the treatment of syphilitic affections of the tongue is somewhat overrated by the authors, and the same is true with regard to plugging the mouth with iodoform gauze after operations, etc. The suggestion to employ a lanoline ointment, as a basis for applications to fissured or sore tongues, is a good one, though of doubtful novelty.

An interesting theory is put forward, that gout and rheumatism predispose to leucoma of the buccal mucous membrane, though the evidence adduced in its favour is of the weakest kind. Presumably the use of such terms as "epizootic" and "chimiotaetic" is unavoidable but not ornamental.

J. HUTCHINSON, JUN.

Edinburgh Hospital Reports. Edited by G. LOVELL GULLAND, M.D., and JAMES HODSDON, M.D. Volume VI. Edinburgh: Oliver & Boyd. 1900.

THE sixth volume of the *Edinburgh Hospital Reports* is fully as good as any of its predecessors, and reflects great credit on the editors and publishers. The list of contributors embraces such well-known names as Affleck, Ballantyne, George Gibson, Berry Hart, Alexander James, Allan Jamieson, Burn Murdoch, Playfair, and John Thomson among physicians, and Annandale, John Chiene, Cotterill, the late John Duncan, MacGillivray, and Alexis Thomson among surgeons. Not the least important papers, however, are contributed by junior members of the staffs of the various Edinburgh Hospitals.

Dr. Lewis Bruce, the accomplished physician of the Murthly Asylum, records a series of cases of "Folie Circulaire" treated with large doses of thyroid powder, some with decided benefit. Dr. Bruce noted that the tendency to sickness was greatly diminished by the omission of flesh from the diet, and considers that the success of the treatment depends on starting it at the outset of the attack either during the period of depression or in the very earliest stage of excitement. Dr. Robert Fleming's observations on cardiac measurements are interesting, showing as they do that in the case of both males and females there is a steady increase in the weight of the heart with each decade, while all the orifices increase in size, that the right ventricle tends to become thinner after thirty, and that only in exceptional cases does the wall of the left ventricle at the apex measure as much as $\frac{1}{4}$ inch in thickness. Dr. Fleming gives the size of the orifices in diameters, which we have found not so convenient

in practice as measurements of circumferences, which are more readily appreciated and remembered. An instructive series of nine cases of congenital heart disease has been collected by Dr. John Thomson, the descriptions of the lesions being contributed by Dr. W. B. Drummond. Dr. Burn Murdoch and Dr. Welsh's case of aortic aneurysm, in a boy of 12, is of special interest on account of its exceeding rarity; and the same may be said of Dr. Burn Murdoch's case of simultaneous double empyema in a child treated by resection of rib on both sides. We observe that Dr. Burn Murdoch, although a physician, himself operated on his case of empyema, a practice which has been advocated for some time by a well-known physician in London, and in favour of which there is a good deal to be said. Chyliform ascites is distinguished from chylous ascites by the absence of any rupture of the lymphatic vessels. Various theories have been put forward to explain its origin, and Dr. Francis Boyd's case and his remarks on the previously recorded cases will repay perusal. Dr. Fowler and Dr. R. Johnston report a case of true congenital hemi-hypertrophy, a remarkable condition about the pathology of which very little is known. Dr. Theodore Shennan contributes a valuable statistical report on tuberculosis in children, compiled from the post-mortem records of the Edinburgh Sick Children's Hospital for the last sixteen years. Two essays, one on Electrolysis in Aneurysm, the other on Angioma, by the late Dr. John Duncan, are of special value. Professor Annandale's and Professor John Chiene's short and practical papers, Mr. MacGillivray's contribution on the Radical Cure of Hernia, with the statistics of seven years' experience at the Royal Infirmary, and Dr. Miles' Clinical Notes on Surgical Cases, will interest surgeons. Of the other papers we can only mention that of Dr. Ballantyne on the Pathology of the Germinal Period of Antenatal Life, which deserves careful study.

The Statistical Reports which conclude the volume are much less elaborate than some of the similar reports published by London Hospitals, and might with advantage contain fuller details.

HECTOR MACKENZIE.

Orthopædic Surgery. By C. B. KEETLEY, F.R.C.S. London: Smith, Elder & Co. 1900.

THIS work, unlike an ordinary text-book, consists of a series of articles, many of which have already appeared in print. They are of very unequal merit, some being short and meagre, others lengthy and rather tedious to read. The deformities seen in ordinary examples of knock-knee, flat-foot, and scoliosis are regarded by the author as the results of "rickets of adolescence," but no evidence is adduced to show that the development of these deformities is preceded or accompanied by any morbid process in the affected bone.

From the preface the reader might expect a great clearing away of the "clouds of falsehood" said to exist in this subject of orthopædics, but what we find is reckless destruction of old views and ideas followed by hardly any attempt at building up knowledge of a more reliable character. Thus it will be found that in many articles, vigorous and

sometimes unintelligible denunciations of very innocent views are followed by assertions as baseless as the reasons upon which those denunciations were founded. We appreciate the fresh and forceful mind guiding the bold attack upon the favourite views current on the causes of scoliosis, and had the author taken more pains to impart his own knowledge in clearer language, he might have succeeded in giving the needful deathblow to the fanciful notions which now burden this subject. Further, the value of his own observations, of which there are a great many, is much diminished by the fact that they are not unfrequently given in such a way that it is difficult for the reader to comprehend their purport and full meaning. Such defects as the above run throughout the work, and materially detract from its usefulness.

Although we cannot praise the portions which treat of Etiology and Pathology, yet we would commend highly the parts which deal with the treatment of many of the deformities considered. When the author begins upon the treatment he seems at home, and he gives directions clearly, concisely, and well—in striking contrast to the manner in which he deals with the remainder. Particularly interesting are his accounts of the treatment of deformities of the knee, foot, hip, and spine, and much very useful information may be gained from him on these subjects. The value of the book is mainly, it seems to us, derived from the grasp which the author evidently possesses of the mechanical principles involved in the treatment of skeletal deformities, and in no article more than in that which deals with talipes is the author's grasp of these principles better exemplified.

In such a work as this one, in which most of the articles are original, it surprises us to find that the good illustrations are for the most part borrowed from foreign or home writers; the remainder are on the whole poor, some being so bad as to be hardly worth the labour involved in their reproduction.

JOSEPH GRIFFITHS.

The Science of Hygiene: A Text-Book of Laboratory Practice. By WALTER C. C. PAKES, D.Ph., F.C.S. London: Methuen & Co. 1900.

UNDER this somewhat pretentious title the author attempts to provide a text-book dealing with all the practical laboratory work required from the candidate for the diploma of Public Health. It is stated in the preface "that excellent as are the text-books which treat of individual parts of the work, there is a great disadvantage in not having the several portions collected under one cover." This is a somewhat doubtful proposition, which is open to two chief objections, namely, that such a book, if its size is to be kept within reasonable limits, must necessarily treat the subjects discussed in a somewhat superficial manner; and, secondly, the student is influenced to forego the advantages derived from a personal acquaintance with standard text-books, and his knowledge is thus circumscribed, and too often of a narrow and imperfect character. In fact, the book gives us the impression of attempting to supply the minimum amount of information acquired in order to obtain a diploma in Public Health. This, however, does not,

happily, constitute the "Science of Hygiene," and the conscientious student will assuredly prefer to possess and to consult standard text-books in each department of his course of study.

The volume is divided into five parts, dealing respectively with bacteriology, microscopical examinations, chemistry, physics, and vital statistics; and, as we have indicated, the usefulness of the work as a complete laboratory manual is impaired by the attempt to cover so much ground. Why vital statistics have been included in a book on laboratory work is hard to understand, more especially as we do not suppose that even the author intends the student to rest satisfied with the account he has given, and to neglect a careful study of such a book as Newsholme's "Vital Statistics." The part dealing with "Meat" is another example of the treatment of a subject in an imperfect manner, and from its perusal we should doubt whether the author had had many opportunities of making himself practically acquainted with the appearances of meat in conditions of health and disease. If this subject had been treated simply from the aspect of the microscopical examination, we would have no exception to take, but this is not so, and the account given is, we hold, apt to mislead the student into a belief that when he has read it, he knows all that will be required of him.

The book contains 182 illustrations. These form a valuable addition to the text, and have in a majority of instances been taken from standard works, and are duly acknowledged, though it seems to point to somewhat careless proof-reading that in the acknowledgment of Leuckart's drawings his name should invariably be spelt Leuchart.

HARVEY LITTLEJOHN.

Hand Atlas of Human Anatomy. By WERNER SPALTEHOLZ, with the advice of WILLIAM HIS. Translated from the third German edition by LEWELLYS F. BARKER, with a Preface by FRANKLIN P. MALL. Vol. I. "Bones, Joints, Ligaments," Leipzig: S. Hirzel. London: Williams & Norgate. 1900.

THE plates of this atlas are reproductions of those with which we have been for some time familiar in the German editions, and are among the most beautiful and artistic illustrations of human anatomy. Practically all the figures have been reproduced by the half-tone process from drawings, and in every case where it is desirable colour has been artistically introduced. In many cases, where the objects illustrated in detail are small, and possess complicated relationships, the plan adopted of indicating the surrounding parts in outline is most successful. Such accurate and striking illustrations as those of the atlas are undoubtedly of the greatest assistance in the study of anatomy, and their production places all interested in human anatomy under an obligation to Professor Spalteholz.

With regard to the text—the author confesses that he undertook the writing of it unwillingly, as he considers a student may too easily acquire the idea that the text will suffice for the study of anatomy. The text is intended to serve for the most part as a guide, and "can in no way render a text-book of anatomy unnecessary." Throughout the

whole work the new anatomical nomenclature is used, which is, we believe, as regards English readers, a mistake. It is true that in some cases the old names are inserted in brackets after the newer ones, still there is no doubt that an English student, when reading the text of the atlas, will experience considerable difficulty with the large number of unfamiliar names and terms used. Quite apart from this, the fact also remains that probably many of the new names will never be in any sense generally adopted by English anatomists, or used by English surgeons and physicians, and these latter will always exercise a very considerable influence on the employment of descriptive terms used in anatomy. From an English student's point of view, it is to be regretted that the text has not been brought more into conformity with the descriptions to which he is accustomed in our standard text-books. If this had been done, there can scarcely be any doubt that the usefulness of the work would have been much increased, and its sale in England considerably augmented.

Viewed in another light, it is true that the text will be useful as affording a concise explanation of each of the terms of the new nomenclature.

A. FRANCIS DIXON.

Ulceration of the Bladder. By E. HURRY FENWICK, F.R.C.S.
London: J. & A. Churchill. 1900.

THIS book extends to eighty-five pages, and embraces a special study of simple, tuberculous, and malignant ulceration of the urinary bladder, based upon personal observations by the author, who has devoted much time, with unrivalled opportunity, to the study of the subject.

The first chapter is chiefly devoted to a consideration of *simple ulcer*. Reference is made to the risks attendant upon instrumentation in cases of non-malignant ulcer—a point of much importance. The author explains how harm may ensue, and then discusses the symptoms and diagnosis of the ulcer, which is often a very difficult matter, from its resemblance to tuberculous ulceration. The differential diagnosis is made not so much from the appearance cystoscopically and the symptoms, but rather by the absence of tubercle bacilli in the urine, or of tuberculous deposit elsewhere. The table on page 24 brings this vividly before the reader. Altogether, indeed, and the author practically admits as much, the entity of simple ulcer is questionable.

In chapter ii., upon “Tuberculous Ulceration,” the author bases his remarks upon 180 cases. He admits the difficulty of determining the part of the urinary tract most often primarily attacked, but gives three ways by which the bladder may be affected—(a) primarily, no other deposit to be found co-existing in the patient; (b) by entrance from a focus in the male genital apparatus, or in the kidney or ureter in either sex; (c) secondarily, by way of blood-stream from some pre-existing focus placed outside the genito-urinary tract. This division, in the light of the text, seems illogical and deficient. It is not told how tubercle reaches the bladder in *a*. No primary focus being discovered elsewhere, does not prove that such focus does not exist. The tubercle must reach the bladder wall by lymphatics, blood-stream, or direct

extension, even in the so-called primary invasion, as, according to the author, the deposit is not on the surface, but beneath the mucous membrane. There is much in this chapter open to criticism, but it is well worthy of careful perusal, more especially as it differs so much from the usually accepted views. In the postulate at page 65 the word *usually* might with advantage be used for the word *often*.

In the third chapter, the subject of "Malignant Ulceration" is briefly discussed—it does not lend itself to so much theory as that of tuberculous ulceration.

Mr. Hurry Fenwick's work is of much interest. The results of careful personal observation over many years are given in an attractive style. The cases quoted are not too numerous, and will repay the time occupied in reading them.

DAVID WALLACE.

1. *On the Use of Massage and Early Passive Movements in Recent Fractures and other common Surgical Injuries, and the Treatment of Internal Derangements of the Knee-joint.* 2. *The Present Position of the Treatment of Simple Fractures of the Limbs.* By WILLIAM H. BENNETT, F.R.C.S. London: Longmans, Green & Co. 1900.

THE papers reprinted in these two small volumes have appeared in the leading journals so recently that they will be familiar to the majority of our readers.

While we agree with the author that the value of early massage and passive movement is still imperfectly appreciated by the profession at large, we do not think that the ignorance of its utility is so widespread as he seems to suggest. The work of Lucas-Championnière (which, by the way, is not referred to by the author), published in 1895, compelled those who see much of fractures to consider this method of treatment, and although few have followed the teaching of the French surgeon in its entirety, none who have given his system a fair trial can fail to be convinced of its value. Our own experience, which has been fairly extensive, enables us to corroborate all that Mr. Bennett says in favour of this plan of treating fractures, sprains, and bruises. We sincerely trust that his writings will secure a wide circulation, as they are admirably calculated not only to promote an interest in the method which he advocates, but also to put a check on the dangerous tendency which has recently manifested itself towards operative treatment in simple fractures.

The lectures on internal derangements of the knee-joint embrace a critical consideration of over 250 successive cases, and are of extreme interest and value.

ALEXANDER MILES.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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DISTURBANCE OF GENERAL SENSIBILITY IN CEREBRAL LESIONS.

VERGER (*Arch. gén. de méd.*, Paris, December 1900), noting first that complete hemianæsthesia, for sensation and sensibility, corresponding to the type of Charcot in all its purity, should be regarded as of hysterical origin, refers to the many proofs given of the occurrence of less complete examples of hemianæsthesia (pseudo-hysterical) due to lesions involving the sensory tract in the brain.

Meynert and Ballet consider that the sensory fibres pass directly from the peduncle to the centrum ovale by way of the internal capsule, without arrest in the central nuclei of grey matter. Monakow, Déjerine, and others believe that they are interrupted between the peduncle and the cortex in the optic thalamus, thus admitting that the band of Reil, the chief sensory tract for the mesencephalon, has its origin in the nuclei of the columns of Goll and Burdach, representing two conjoined neuronie sections, the one bulbo-thalamic, the other thalamo-cortical. Gudden's method produces by peripheral injury to a neuronie item degenerative changes progressive in a direction opposite to that known as Wallerian. By means of this phenomenon, several observers have shown that many of the nuclei in the optic thalamus are directly connected with the cerebral cortex, those in its external portion more especially with the central convolutions. *Per contra*, lesions of the optic thalamus may induce ascending degenerative changes reaching to the cortex.

Déjerine and Long more recently submitted the following propositions:—"Hemianæsthesia of general sensibility is met with in central lesions of the hemispheres under two conditions—(1) in cases of thalamic lesion destroying the terminal fibres of the sensory paths from the peduncle, and the fibres of origin of the thalamo-cortical neuronies; (2) in cases where, the thalamus being intact, the connections with the cortical, sensory, and motor apparatus are more or less destroyed; in

these cases the lesion is always very widespread ; (3) it is chiefly where the thalamus is damaged that the hemianæsthesia is persistent." Verger quotes three illustrative cases from a Paris thesis of 1899 by Long.

In the first an extensive hæmorrhage, causing total left hemiplegia, and anæsthesia over the whole of the same side, was found post-mortem to have its site on the right cerebral hemisphere, and, along with areas of softening, to occupy the deeper parts of the first and second occipital, and of the second and third frontal convolutions, while a large area of softening took the place of the insula, external capsule, and the lenticular nucleus. The lesion had interrupted the sensory fibres between the cortex and the thalamus. The second case illustrated hemianæsthesia from lesions of the optic thalamus and internal capsule, with total hemiplegia on the same side ; while in the third a localised lesion of the internal capsule, involving only the posterior segment and part of the lenticular nucleus, was accompanied by total hemiplegia, and but slight signs of disturbance of sensory functions. The last case is in absolute disagreement with the previously accepted theory, as to the sensory tracts monopolising the posterior portion of the internal capsule.

Dealing with the relationship between the clinical symptoms of hemianæsthesia and the localisation of the causal lesion, Verger makes use of several cases, observed by himself and by others, and concludes, first, that the elementary power of perceiving painful sensations is independent of their characterisation and localisation, and persists in great part even after extensive central lesions. Abolition of sensibility to pain is not an integral part of the syndroma of cerebral anæsthesia, although it is usually diminished. Recognition of the nature and the site of painful impressions, however, may be greatly disturbed. Further, on referring to cortical lesions, he states that destructive lesions, whatever their nature, affecting the cerebral cortical substance over the area comprising the ascending parietal, the frontal, the foot of the first and second frontal convolutions, and the anterior portion of the parietal lobe, can occasion hemianæsthesia over the opposite side of the body. Material damage to this area, in view of the distribution of sensory phenomena, apparently originates morbid alterations of sensibility and sensation, corresponding in character and distribution to the extent and position of the causal lesion ; perhaps in consonance with the arrangement of motor centres, so that an injury to one of the latter cannot occur without simultaneous involvement of the thalamo-cortical sensory neurones affiliated to the regions supplied by its twin motor centre.

The clinical signs of hemianæsthesia of cortical origin are very similar to those from central cerebral lesions. The presence of Jacksonian epilepsy, aphemia, deafness, word-blindness, or the conjunction of a monoplegia and anæsthesia are in favour of a cortical origin. But, in the great majority of cases, all that can be ventured on is that the hemianæsthesia arises from a cerebral source.

ACUTE MALIGNANT ACROMEGALY.

STERNBERG, in Nothnagel's "Pathology," separates cases of acromegaly into three classes—(1) a benign form, causing little discomfort, and of

prolonged duration, even up to fifty years; (2) a common form, of from eight to thirty years' duration; (3) and an acute type, terminating in three or four years. The acute form is apparently of slightly more frequent occurrence than the benign, but the two together only constitute 4·3 per cent. of Sternberg's total cases. Gubler (*Cor. Bl. f. Schweiz. Aerzte*, Basel, December 15, 1900) reports an example of the third or acute form of the disease. A female, born in 1863, of sound peasant stock, and of good personal history previously, ceased to menstruate in July 1893, but for some time before had suffered from headaches and pains in her limbs, with a progressively increasing sense of bodily weakness. A year after, the sight of her left eye began to fail; two years after, that of the right. Admitted for treatment in December 1895, little save symptoms of complete facial paralysis in the right side could be detected, and weakness of vision in the right eye, with central scotoma. No divergence from the normal in nerve and muscle reactions. Twenty-five days after admission (!) it was noticed that her hands and feet were large and thick, that her nose was of great size, the lips coarse. Gynæcological examination gave no evidence of disease, except that, for a multipara, the uterus and adnexa were of small size; menstruation had not reappeared. Dismissed in March 1896, her feelings of general weakness increased, her headaches became accentuated, her vision enfeebled. By October of that year her appearance had become typical of acromegaly, her head enlarged, the nose much thickened, the lower jaw obtrusively overgrown, projecting beyond the upper. The skin of the scalp and face almost elephantoidal, lips swollen, neck thickened, larynx enlarged, kyphotic curvature in lower cervical and upper dorsal region, leading to bent-forward gait and attitude. The thorax appeared as if pressed inwards; the ribs and sternum were broadened; the hands enormously greater both in length and breadth; the arms even enlarged, but to a slighter degree. The feet, flat and irregularly large. Continual severe cephalalgia was present over the entire head, but more intense on the right side, with distinct hyperæsthesia to pressure over the region of the right trigeminus. Voice harsh, masculine. Frequent attacks of vertigo, often terminating in fainting; and as even minute doses of various analgesic and narcotic drugs, given for the neuralgic pains, sufficed to induce such attacks, their use could not be persevered with. Death took place in September 1897, four years and a few months from cessation of menstruation, and the earliest notice of enlargement of the hands. Post-mortem, the skull was found to be thickened, the diplôë in many places absent, otherwise thinned. On the removal of the brain, a tumour, of a goose-egg size, was found protruding from the sella turcica, involving the optic tract and chiasma; the rest of the brain was normal. The sella turcica itself had the dimensions $4 \times 3 \times 2$ cms. Microscopic examination of the tumour showed it to be a diffuse hyperplasia of the tissue of the pituitary gland, a "struma parenchymatosa hypophyseos." The chief of the early symptoms consisted here of menstrual cessation, as has been recorded in the majority of former cases; the subsequent atrophy of the sexual organs was rather the result of a premature menopause than of this special disease. The well-known prodromata, acroparæsthetic symptoms, were present in the case. Among the

cerebral symptoms, due to pressure from the tumour, headaches take the first place. The changes in the influence of the tumour on the trigeminal nerve during the different stages of the disease are worthy of notice: at the beginning of 1896, sensibility over the region supplied by this nerve was greatly lowered; in the autumn of the same year markedly increased, a phenomenon which its earlier paralysis and the later irritation of the Gasserian ganglion fully explained.

An important fact in the progress of hypophyseal lesions, regarding them as the true cause of acromegaly, and the cases clinically akin to that disease, in which, after death, no pituitary lesion can be found, compared with other morbidities, lies in the earlier appearance of symptoms characteristic of cerebral tumours than of those diagnostic of acromegaly. In the case described above, in the summer of 1894, the pituitary growth must have already reached a considerable size, to account for the left-sided temporary amblyopia recorded; while signs of acromegaly were not yet apparent. Even a year later the symptoms common to cerebral tumours overshadowed those of acromegaly, which, however, were distinctly recognisable. No manner of treatment availed aught. Thyroid preparations were useless.

Breton and Michaut (*Gaz. d. hôp.*, Paris, December 13, 1900) first report an instance of amyotrophic acromegaly in the person of a female, æt. 61, who began to suffer from neuritic and muscular symptoms six months after the birth of her second child, when she was 30 years of age. Four years afterwards she gave birth to a third infant. Following this, she presented no other symptoms for six or seven years than occasional attacks of extremely violent pain in both hands. As these years went by, her power of using her hands decreased, until at the end of the period she had lost all use of them; and the hands themselves enlarged, the left one first. Later on her feet increased in size, although they were never the seat of pain. Her teeth even grew larger, and fell out without pain or apparent cause. On examination, atrophy of all the muscles of both arms, more intense on the left side, was noted; an atrophy which commenced at the same time as the enlargement of the bones, but which during the previous twelve months had made more rapid progress. No reaction of degeneration was exhibited. The thyroid gland was atrophied. Secondly, these authors record a case of acromegaly with very marked glycosuria. The patient, also a female, æt. 50, began to suffer in 1887, when menstruation abruptly ceased. Almost immediately afterwards, violent facial neuralgia set in, and had since never been entirely absent. Primarily and persistently, localised in the right temporal region for ten years, during severe attacks the pain extended over the entire surface of the head and cervical region. At the commencement, acute enteralgic crises occurred synchronously with the absent menstrual flow. The facial neuralgic attacks were accompanied by pronounced œdema of the face. In 1896 the patient was attacked by amnesia, and later on in the year by polyuria, thirst, amblyopia, deafness, and glycosuria. A year later, when examined, all the symptoms already noted persisted; pressure upon the points of exit of the facial sensory nerves produced severe pain; she displayed typical signs of acromegaly, while making complaint only of her diabetic symptoms. The urine

varied between 6 and 7 litres per diem ($10\frac{1}{2}$ –12 pints), containing 603·40 grms. of glucose, or 86·20 grms. per litre (38 grs. per oz.), and was in specific gravity, 1040. A month later the urine amounted to 4 litres in twenty-four hours, 1033; 47·5 grms. glucose per litre (21·7 grs. per oz.). Very pronounced peptonuria had continued throughout the previous month.

These two cases of acromegaly, both affecting females, differ completely one from the other. The one, acromegaly complicated with general muscular atrophy; the other, acromegaly overshadowed by the effects of glycosuria, of which alone the patient complained, and which apparently influenced the course of the first disease, thrusting it into a subsidiary position. The close connection between the reproductive organs in the female and the acromegalic process (in the first case, the menses continued regular for four years after the earliest symptom of the disease, but stopped after childbirth at 34; in the second, the onset of symptoms and the cessation of menstruation were simultaneous) is of importance, and has before now led to the theory that acromegaly is of genitary origin. Conversely, it seems more logical to regard the genitary failings as a result of the acromegalic affection. In this connection the observation of Friedmann and Maas (*Berl. klin. Wchnschr.*, December 24, 1900) are of interest. They removed the hypophysis cerebri in cats eighteen times. In three of these, traces of the gland were left, and the animals died after two and a half, three, and four months respectively; the remainder, save for one, succumbed to various complications within a few days of operation. The animal which survived, in which complete removal of the gland was afterwards ascertained, lived for three and a half months in the best of health, and after being put to death exhibited no sign of disease. The gland therefore is not essential to life. For some days after operation sugar could be detected in the urine; never any albumin. No support was offered by these results to the theory that arrest of pituitary function produces acromegaly.

[As the duration of the longest experiment only extended over four months, no trustworthy argument can be based on the results obtained regarding the etiology of acromegaly, a disease to which such a period of time is as naught in man, and may be of still less moment in cats.

A. L. G.]

Cyon also (*Arch. f. d. ges. Physiol.*, Bonn, Bd. lxxxi. S. 267), operating on rabbits, dogs, and sheep, found light mechanical stimulation of the hypophysis to effect a slight rise in blood pressure; electrical irritation acted similarly with, as well, a decrease in the amount of urine. The well-known effect of stimulating the mucous membrane of the nose with strong volatile irritants failed to occur in dogs after destruction of the gland. Cyon, in addition, discusses the value of pituitary extracts, stating that two antagonistic bodies can be isolated—the one acting in similar fashion to atropin and suprarenal extract, the other influencing and modifying increase of blood pressure.

SURGERY.

 UNDER THE CHARGE OF

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 RUPTURE OF THE DIAPHRAGM.

APART from stabs and gunshot wounds which injure the diaphragm after penetrating the lateral wall of the thorax, rupture of the diaphragm is a very rare injury, and is nearly always fatal within 24 or 48 hours, usually from simultaneous injury of internal organs causing hæmorrhage or peritonitis (stomach or intestines). The special symptoms in addition to shock, etc., are, pain referred to the region of the stomach, superficial and rapid breathing, and the physical signs of displacement of the viscera. It is not always diagnosed during life, because the condition of the patient may not permit of the necessary examination.

Interest attaches to the method in which the subcutaneous rupture is produced; the cases here cited support the view that the rupture is the result of a sudden and great increase in the intra-abdominal pressure. The first case, reported by Weischer (*Centralbl. f. Chir.*, Leipzig, Sept. 22, 1900), is that of a labourer, æt. 28, who was sitting on the ground after his midday dinner, leaning against a heap of logs of wood, when the latter suddenly collapsed and fell on the top of him; when released he was found to be unconscious, the shoulders touching the knees and the head between the legs. When admitted to hospital he was in a state of collapse, with dyspnœa, and pain in the left chest; the left side of the chest was very sensitive, and did not move with respiration; there was tympanitic resonance over the left chest, completely obscuring the cardiac dulness, while below the seventh rib there was dulness, continuous with that of the spleen. In the evening there was some reaction; he had swallowed brandy and coffee. The dulness had risen to the sixth rib. The next morning he began to vomit, and died. The left pleural cavity was entirely filled up with the greater part of the distended stomach, the middle portion of the transverse colon with its omentum and the spleen. There was a rent in the left vault of the diaphragm 12 cms. in length, beginning in front in the mammillary line, and extending backwards towards the middle of the last rib. There was a cupful of blood in the pleural and peritoneal cavities in the neighbourhood of the rent in the diaphragm.

The author holds that in the attitude described the trunk was pressed violently forwards against the thighs, increasing the intra-abdominal pressure until the wall gave way like an over-distended rubber bag, the rupture taking place at the site of least resistance, namely, the vault of the diaphragm. The occurrence of the rupture was probably favoured by the stomach being filled with the midday meal, and by the simultaneous compression of the thorax by the weight of falling wood, producing forced expiration and collapse of the lung, so that the diaphragm was imperfectly supported.

The second case, reported by Bergmann (*Centralbl. f. Chir.*, Leipzig, Dec. 1, 1900), is interesting as an illustration of rupture of both halves of the diaphragm, along with rupture of the liver and kidneys. A mason was working in a pit at 4.30 A.M., when he was thrown to the ground and buried under a mass of stones. He was at first unconscious. He was admitted to hospital in a collapsed condition, and complaining of severe pain in the region of the stomach. There was an extensive extravasation of blood over the anterior part of the left chest, and the ribs from the sixth to the tenth were broken. In the evening he began to vomit; bloody urine was drawn off with the catheter; the respirations increased to 40 per minute, and he died one and a half hours after midnight. On opening the left chest, the pleural cavity was found to be occupied by the greater part of the stomach, blown up with gas, displacing the lung upwards and the heart backwards. In the wall of the stomach there were several superficial ruptures. There was commencing peritonitis over the stomach, intestines, and diaphragm. There was half a litre of blood in the peritoneal, and a quarter litre in each pleural cavity. On withdrawing the stomach from the thorax, the rent in the diaphragm was found to be large enough to admit the fist, and to have opened into the pericardial sac. On removing the right lung from the chest, a triangular slit was found in the right half of the diaphragm, about two inches from the vertebral column. There were several ruptures of the liver and of both kidneys.

The cause of death was shock and internal hæmorrhage. The rupture of the diaphragm was not diagnosed during life. The author regarded the diaphragmatic rupture as caused by increase in the intra-abdominal pressure, a view which is supported by the injuries sustained by the liver and kidneys. Such a rupture as is here described, in the right half of the diaphragm, is extremely rare.

A third case was observed some years ago by the abstractor in the Edinburgh Infirmary, in which a man, working in a mine, was doubled forwards by a heavy mass of coal falling on his shoulders; the spine was fractured in the lower dorsal region, causing complete paralysis of the lower extremities; the breathing was extremely rapid and superficial, and he died within 48 hours. The left half of the diaphragm was extensively torn, and through the rent the stomach and transverse colon were displaced into the pleural cavity.

CLOSURE OF DEFECTS IN SKULL BY GRAFTS TAKEN FROM THE OS CALCIS.

KONRAD BÜDINGER records an interesting case in which he employed slices of the os calcis from a recently amputated limb to close defects in the skull, and in which he had an opportunity of investigating the condition of affairs after an interval of nearly four years. The patient, a boy æt. 5, was the subject of multiple tuberculous lesions; three of these, situated on the skull, had broken down with open sinuses. On October 12, 1896, the sinuses were laid freely open, and the tuberculous granulations removed by the spoon; it was found that the bone was eaten away, the internal table over a wider area than the external, and there were granulations on the outer surface of the dura mater. By

means of rongeur forceps, the edges of all three openings were cut away until healthy dura was exposed. The two larger openings, situated respectively in the frontal and parietal bones, were circular in shape, and had a diameter of 3 cms. ; the third opening, also in the parietal bone, measured 2 cms. long by 1 cm. broad. The wounds were packed with iodoform gauze, and partially closed by means of sutures. Ten days later, there was an amputation of the thigh for tuberculous disease of the knee-joint in a woman nearly 70 years of age. As soon as the limb was removed, the os calcis was exposed and two slices were taken from it with the saw, of about the same thickness as the skull of the little patient. The slices were trimmed with a pair of strong scissors until they exactly fitted the two larger gaps in the skull above mentioned ; the edges of the gaps were scraped with the sharp spoon, the slices of os calcis placed in position, and the skin stitched over them. The third small opening was not grafted, partly because it was still discharging, and partly because it might prove useful as a control observation. The parietal wound healed by first intention ; that over the frontal bone discharged a drop or two of pus from a small central opening for about two months, and then healed. When he left the hospital five months later, the implanted portions of bone appeared to have taken firm root, and the gap which had not been closed appeared to have diminished in size. Two years later, all the openings appeared to have become closed by firm bone. In April 1900, nearly four years after the operation, the child died of general tuberculosis. The disease in the skull had not relapsed ; the calvaria was removed and macerated. The small opening, which had been left to nature, had diminished about one-half by a thin layer of bone which had grown in from the margins ; the central area was occupied by a tough fibrous membrane. The situation of the grafted openings was only recognisable on the inner aspect of the skull by shallow depressions ; the new bone even presented the usual grooves for the branches of the meningeal artery. On the outer aspect of the skull the grafted areas were also a little depressed in the centre, and the surface of the bone was rough and uneven. An interesting fact was observed, namely, that the bone in the situation of the grafts was almost entirely *compact* in texture.

The author discusses the subject of bone-grafts in general, and makes the following comments in connection with the case:—"Whenever feasible, it is better to employ spongy bone for grafting purposes than bone which is compact ; the age of the person from whom the graft is taken is of little consequence ; the wound into which the graft is introduced need not be absolutely free from infection ; the human os calcis is a very suitable bone for grafting purposes, because the slices taken from it may be easily trimmed into shape with scissors."—*Wien. klin. Wchnschr.*, Nov. 15, 1900.

REMOVAL OF LARGE LIPOMA OF MESENTERY.

LATOUCHE of Autun records the case of a woman, æt. 53, who applied for treatment on account of a large tumour of rapid growth, seated towards the right side of the abdomen. The diagnosis was obscure. At first it was thought to be an ovarian cyst, and then it was regarded as a

cystic sarcoma of the mesentery. At the operation it was found to be an enormous lipoma of the mesentery, weighing about 13 lb. It was easily removed, except in the vicinity of the liver, where its separation was attended with considerable hæmorrhage, which was only arrested by packing. The patient made a good recovery.

EXCISION OF THE ELBOW FOR ANKYLOSIS FOLLOWING GONORRHOËAL ARTHRITIS.

OLLIER exhibited to the Surgical Society of Lyons a female patient, on whom he had operated as above. There was complete ankylosis between the humerus and ulna, while the movements of the radius were preserved. An attempt was made, in the first instance, to break down the adhesions, but this was followed by recurrence of the ankylosis. The joint was freely exposed, and the bones were separated by means of the scissors; the ends of the bones were removed in the usual way, and at the same time the capsular ligament was clipped away. The new joint possessed admirable movement, and the muscles which had been wasted for eleven months were rapidly recovering.—*Rev. de chir.*, Paris, December 1900.

THE TREATMENT OF INFECTED WOUNDS WITH PEROXIDE OF HYDROGEN.

THE use of peroxide of hydrogen in infected wounds is strongly recommended by von Bruns, who has employed it in his own clinique during the last six months. Its chief peculiarity is the readiness with which it decomposes into oxygen and hydrogen when mixed with such fluids as blood and pus, giving rise to an abundant fine froth. It is chiefly used as a 1 per cent. solution for irrigating or packing infected wounds, with the result that the wound surfaces soon become covered with healthy granulations, while any putrid smell rapidly disappears. Apart from its specific action on septic organisms, and its stimulating action on the tissues, it has a powerful mechanical influence in virtue of the abundant froth, which carries away discharge, blood clot, and sloughs, and thus thoroughly cleanses the wound.—*Berl. klin. Wchnschr.*, 1900, No. 19.

ARTHROPATHIES RESULTING FROM SURGICAL AFFECTIONS OF THE SPINAL CORD.

CHIPAULT has investigated the joint lesions which may follow upon injuries of the spinal cord, vertebral tuberculosis, and tumours encroaching on the spinal canal. In unilateral injuries (stab-wounds) of the cord, the knee on the paralysed side has been observed to fill with fluid, with or without periarticular œdema, in the second or third week after the injury. In four cases of fractured spine, the author has also observed arthropathies, with effusion into the joint, coarse friction on movement, and changes in the bones and ligaments; also in Pott's disease, and in tumours of the vertebral column, he has observed effusion into the knee, frequently hæmorrhagic in character. The author regards these affections as analogous to those observed in locomotor ataxia, and as the

result of vasomotor disturbances as evidenced by the hæmorrhagic effusions into the joint, and the congested condition of the articular structures.—*Centralbl. f. Chir.*, Leipzig, Dec. 22, 1900.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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OVARIAN CYST WEIGHING FIFTY KILOS.

ROUFFART (*Bull. Soc. belge de gynéc. et d'obst.*, Paris, 1900, No. 10) reports the following case:—The patient, a multipara, æt. 59, had been aware for fifteen years of a small tumour in the umbilical region, which had gradually increased in size. In 1897 she experienced pain and discomfort, became bedridden, and had attacks of suffocation and indigestion, even changing of position in bed causing her excruciating abdominal pain. In December 1898, bleeding, which had been present for some time, became constant, and eight months later the abdomen began to enlarge rapidly, ultimately measuring 1·75 metres in circumference. An immense umbilical hernia containing a great part of the intestines was discovered, and behind the bowels a large fluctuating tumour was found, presenting the characters of an ovarian cyst. On bimanual examination, a cervical polypus as large as a foetal head was also found. On Feb. 7 the abdomen was opened, the adhesions of bowel to the lower side of the hernial aperture detached, and the bowels turned back. The cyst was exposed and punctured, and 35 litres of fluid escaped. The cyst was drawn into the abdominal incision and freed from adhesions to the under side of the liver, the intestines, and abdominal wall, when the tumour was found to contain a large number of smaller cysts, containing opaque white gelatinous matter; these were opened and sponged out, and the whole tumour removed, when it was found to weigh 12 kilos, in addition to the fluid removed when the original cyst was punctured. The uterus and appendages were then removed, but it was found impossible to cure the hernia. The patient made an excellent recovery, and was discharged cured on February 25.

OBSTETRICAL ANÆSTHESIA BY MEANS OF INJECTION OF COCAINE UNDER THE LUMBAR ARACHNOID.

DOLERIS and MALARTIE (*Semaine méd.*, Paris, July 18, 1900) record five cases of parturient women in whom the use of general anæsthesia was replaced by the injection of cocaine into the arachnoid cavity of the lumbar spine. From five to ten minutes after injecting from 1 to 2 cgrms. of cocaine, the pain caused by the uterine contractions ceased, and the analgesia thus obtained lasted from an hour and a half to two hours. The contractions were more energetic, more frequent, and longer after the injections, and between them the uterus remained in a

state of semitension for a varying time. It would therefore seem prudent not to use cocaine anæsthesia in cases where podalic version may be required. The loss of blood appeared to be less than usual ; in no case had the injections any effect on the fœtus.

Bumm of Bâle and his assistant Kreis have also experimented with cocaine in six cases, five of the patients being primiparæ. In these cases, after dilatation of the cervix was complete, 1 cgrm. of chlorhydrate of cocaine was injected, after the method of Tuffier (*Semaine méd.*, Paris, 1900, p. 167). At the end of five or ten minutes there was absolute analgesia of the lower portion of the body, extending as far as the edge of the ribs. Tactile sensation was lessened, but voluntary movements were unimpaired. Uterine contractions were as frequent and intense as before, but were quite painless, causing only a sense of tension in the abdomen. The patients had complete control of the power of "bearing down," and also of the inclination to do so. The pressure of the fœtal head on the pelvic floor did not give rise to any pain. In two cases delivery was spontaneous, and there was no pain as the head passed over the perineum. Twice forceps were applied, and once the aftercoming head had to be extracted. In no case was there any suffering. Similarly, the suture of the perineum was unattended by pain. The expulsion of the secundines was normal in all cases. The use of cocaine caused no serious trouble in any of the cases ; two patients suffered from headache with slight vertigo and vomiting.

THE REMOVAL OF PELVIC INFLAMMATORY MASSES BY THE ABDOMEN, AFTER BISECTION OF THE UTERUS.

HOWARD A. KELLY (*Am. Gynec. and Obst. Journ.*, N.Y., Nov. 1900) has already pointed out the great advantage of bisecting the myxomatous uterus in certain complicated cases of enucleation by the abdominal route, and holds that bisection of the uterus is also useful in certain cases of pelvic inflammatory disease. Where the ovaries are seriously involved in the disease, and it is hopeless to attempt to save them, the diseased organs should be removed along with the uterus in this way : By freeing the tube and ovary on the least adherent side first, and then, after tying off the broad ligament and pushing down the bladder and securing the uterine artery, the most difficult side is easily reached and enucleated, by cutting across the cervix and exposing the opposite uterine vessels, and ligaturing them. The uterus is then pulled up, until the round ligament is caught and divided. At this point the operation may follow one of two courses, according to the difficulties encountered. First, if, after dividing the uterus and pulling it up, the remaining tube and ovary can be readily enucleated by peeling them out from below upwards by working with the fingers in the lower and anterior part of the pelvis, just opened up by the detachment of the uterus, then the enucleation may be concluded by removing all the structures *en masse*. In the second place, if the tube and ovary on the far side are densely adherent and cannot be enucleated, then the uterus should be clamped off at the cornu, and removed with one tube and ovary, and the more difficult side left to be dissected out after emptying the pelvis, thus securing the advantages of increased space and light. He goes on to

describe a method of enucleation through an abdominal incision, applicable to a still more difficult class of case, as when there are pelvic abscesses on both sides densely adherent to all the surrounding structures, including the uterus, and the uterus itself almost or entirely buried in a mass of adhesions. The method is as follows :—If the uterus is buried out of view, the bladder is first separated from the rectum, and the fundus found. Then, if there are any large abscesses, adherent cysts, or hæmatomata, they are evacuated by aspiration or puncture, and the rest of the abdominal cavity is well packed off from the pelvis. The right and left cornua are each seized with a pair of Museau forceps, and lifted up, and the uterus incised in the middle line antero-posteriorly, and, as the uterus is bisected, its cornua are pulled up and drawn apart. With a third pair of forceps the uterus is grasped on one side on its cut surface, as far down in the angle as possible, including the anterior and posterior walls. The Museau forceps of the same side is then released and used for grasping the corresponding point on the opposite cut surface, when the remaining Museau forceps is removed. Thus two forceps are in constant use at the lowest point, the author applying them commonly three or four times. As the uterus is pulled up, and the halves everted, it is further bisected down into the cervix, or all the way down into the vagina, if panhysterectomy is to be performed. The uterine canal must be followed, if necessary using a grooved director. The Museau forceps are now made to grasp the uterus well down in the cervical portion, if it is to be a supravaginal amputation, and the cervix is bisected on one side. As soon as it is divided, and the uterine and vaginal ends begin to pull apart, the under surface of the uterine end is caught with a pair of forceps and pulled up, and the uterine vessels, which can now be plainly seen, are clamped or tied. As the uterus is pulled still further up, the round ligament is exposed and clamped; then finally a clamp is applied between the cornu of the bisected uterus and the tubo-ovarian mass, and one half of the uterus is removed. The opposite half of the uterus is also taken away in the same manner. The pelvis now contains nothing but rectum and bladder, with right and left tubo-ovarian masses plastered to the sides of the pelvis, affording abundant room for investigation of their attachments as well as for deliberate and skilful dissection; the wide exposure of the cellular area over the inferior median and anterior surface of the masses offers the best possible avenue for beginning their detachment and enucleation. It may be found, on completing the bisection of the uterus, that each tube and ovary can be removed along with its corresponding half of the uterus, reserving for the most difficult cases the separate enucleation of the tube and ovary after removal of the uterus.

GLANDULAR CYSTOMA OF THE OVARY.

KOSSMANN (*München. med. Wchnschr.*, 1900, S. 362) removed from a girl æt. 15 a colossal cystoma, which had grown so rapidly as to enlarge the abdomen as quickly as pregnancy. Three months later, a new tumour, almost as large as the former one, necessitated a second operation; while six weeks afterwards a pseudo-myxoma, containing 6 to 8 litres, had formed. This also was removed; but the patient succumbed six hours after operation, from cardiac failure.

THERAPEUTICS.

 UNDER THE CHARGE OF

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 INFLUENCE OF VARIOUS MEAT PREPARATIONS ON THE HEALTH
AND GROWTH OF ANIMALS.

By an elaborate series of experiments on guinea-pigs, Gautier tries to solve the problem whether the various meat preparations offer a supply of utilisable material to the organism, and what their effect is in health and in disease. Gautier first found out what was the normal composition of the diet of guinea-pigs at various ages, and then, by replacing definite proportions of the albuminous material by meat preparations, was able to contrast the gain in weight with control animals fed on normal diet. Meat preparations vary in their composition and method of preparation. As a representative extract he used Liebig's, containing 23 to 34 per cent. of albuminous material. Artificial peptones prepared by the action of ferments are rich in albuminous material (70 per cent.), but contain bitter alkaloidal substances, which make them unpleasant and irritating. Somatose, made by acting on blood fibrine by weak alkalies and then rapidly digesting, contains 78 per cent. of albuminoids, but has been shown by Voit to be so irritating that not more than 20 grms. can be given per diem, that is to say, only about one-sixth of the albumin necessary can be given as somatose. Those peptones obtained by the action of superheated steam are more palatable and less irritating. Thus *peptonum carnis* contains 45 per cent. of albuminous material. Commercial gelatin contains 75 per cent. of actual gelatin. In the experiments definite proportions of the albuminous material were replaced by equivalent amounts of the various preparations, and the utilisation contrasted with that of normal diet. It was found that even in healthy young animals only a relatively small amount could be replaced (not more than one-sixth), with the exception of gelatin, which in young animals can replace one-half of the total albuminoids without affecting the utilisation co-efficient to any serious extent. By two series of experiments, lasting three and a half and four months, Gautier was able to conclude that for young growing omnivorous animals, in every case the natural diet is more nourishing than one in which part of the albuminous principle is replaced by artificial meat preparations. For a certain amount of nutritive principles absorbed, the increase in weight is greatest for the normal diet. Thus, during the first few months of its life, for every 100 grms. of normal food consumed, the guinea-pig gains 18.8 grms. in weight. If one-eighth of the albumin be replaced by somatose, Liebig's extract, or *peptonum carnis*, the amount gained is only 16 grms., i.e. a loss of one-seventh. In perfect health no advantage is gained by giving part of the diet in the form of artificial meat preparations. In order to find out the action of these substances on the

animal in a weakened state, Gautier availed himself of the fact that, if a guinea-pig be fed for a few days on cabbages which have been frozen, and they are then replaced by equivalent amounts of fresh carrots, though the rest of the diet remains unaltered, the animal loses weight. Comparative experiments on this weakening diet showed that, while all the animals lost weight, the control animals on ordinary diet lost most weight, though at the commencement they were in the best condition. Those which received one-tenth of their albumin as peptonum carnis lost least. After keeping them on this diet for a month, cabbages were substituted for carrots, and all the animals began to gain in weight. Here again those on meat preparations gained more rapidly than the controls. The animals on one-tenth peptonum carnis gained twice as much as the controls on normal diet. Gautier thus concludes that, though useless in perfect health, in debilitating circumstances, and during convalescence, the replacing of a small proportion of the diet by meat preparation (preferably peptonum carnis and Liebig's Extract) is distinctly advantageous, and leads to a more rapid gain in weight.—*Bull. Acad. de med.*, Paris, 1900, No. 11.

IODISM AND SULPHOCYANIDE IN THE SALIVA.

MUNK has an interesting communication (*München. med. Wchnschr.*, 1900, No. 50) on this subject. While systematically testing saliva for sulphocyanides, he was struck by the fact that patients who showed a large amount in their saliva, almost without exception suffered from severe iodism if potassium iodide was administered to them; while patients who gave no sulphocyanide reaction bore iodides well. If the saliva gave a deep brownish red colour with a solution of ferric perchloride slightly acidulated with HCl, it is rich in sulphocyanides; but the contrary, if, on adding the reagent, the colour is no deeper than that got on adding it to an equal amount of water. Iodism may be due to the fact that sulphocyanide in solution is able to form free iodine from potassium iodide. It is to be noted that iodism affects only those mucous membranes which secrete sulphocyanide, while the intestinal and genito-urinary membranes never seem to be affected. Munk thinks that the presence of a strong reaction in the saliva might contra-indicate iodides being administered in cases where iodism might prove dangerous. He instances a case of paralysis of the abductors where iodism might have seriously impeded the breathing.

TREATMENT OF RHEUMATIC FEVER.

LUFF (*Practitioner*, London, January 1901) holds that the salicylate treatment lessens the pain and fever, but does not actually shorten the duration of the disease. It is improbable that the salicylates act by directly destroying the specific germ; more probably they destroy or neutralise the toxin either directly or indirectly by acting on the liver and skin. The salicylates relieve the pain and fever so readily that the patient becomes careless and takes liberties, and thus brings on a recrudescence of the disease. The patient should be kept at rest for six weeks. If the heart becomes affected, he should have absolute rest

for eight weeks from the onset of cardiac involvement. Alkalies, by increasing the alkalinity of the blood and diminishing the hyper-fibrinosis, seem to avert or diminish the tendency to endocarditis. Luff combines the salicylates and the alkaline treatment, the former relieving the discomfort and the latter protecting the heart. The natural salicylate salt is preferable to the artificial. For children salicin should be employed. Small blisters may be applied near the joints, or methyl salicylate may be applied on lint covered with guttapercha tissue sealed to the skin by chloroform. The salicylates should be very gradually withdrawn, and changes in the diet should be carefully made. It must be remembered that rheumatism is a prolonged disease, and that salicylates, by removing all pain, may tempt the patient to too much activity. Children are especially to be watched. Should the heart become affected, our principal means are absolute prolonged rest, free use of salicylates, fluid (chiefly milk) diet, free diuresis, and daily evacuation of bowels. Small blisters may be applied between the clavicle and nipple, and iodides given to promote absorption. Should the heart muscle become affected, opium may be used to diminish the pulse and quiet the patient. For dilatation and failing cardiac power, digitalis is useless, and ammonium carbonate with hypodermic injections of strychnine are best. For two or three months after apparent recovery, active or violent exercise is to be carefully avoided.

CLINICAL EFFECTS OF UROTROPINE.

EDWARD L. KEYES, Jun. (*Therapist*, London, November 15, 1900) gives some experiences of the drug. German investigators claim that urotropine, the ammonium salt of formaldehyde, acts chiefly on the urinary organs; that its action is in part due to the liberation of formaldehyde in the urine, and that its effects are increased acidity, marked antiseptic properties, and a variable amount of irritation about the neck of the bladder. The amount of irritation seems to depend on the individual idiosyncrasy. Thus in the case of a man of 70, who for twenty years had suffered from cystitis, $7\frac{1}{2}$ grs. of urotropine caused such marked irritation that the drug had to be stopped. After the irritation had subsided, 15 grs. a day cleared the urine of bacteria, while 20 grs. a day caused marked irritation. In a case of acute pyelitis following childbirth, urotropine, 20 grs. per day, reduced the temperature to normal in forty-eight hours; but, though continued for a month, had no effect on the bacteriuria or albumin. After a month's interval, 45 grs. daily, continued for nine days, removed the bacteria, but did not affect the albumin, and a cure only resulted after continuation of daily doses of 15 grs. for another month. Keyes says that the drug has a very valuable effect in preventing urinary chills or septicæmia after dilating strictures. In one case of acute suppression of urine, after external urethrotomy, 7, 5 grs. q.i.d. relieved the condition, which recurred again on stopping the drug. Sometimes the formaldehyde given off in the urine has an escharotic effect, as in a case of suprapubic prostatectomy, where the incisions became covered with a tough leathery slough, which prevented healing, and which only yielded after urotropine was replaced by salol.

TREATMENT OF PRURITUS SENILIS.

JAENICKE (*Centralbl. f. innere Med.*, Leipzig, 1900, No. 48) describes a simple method of treating this troublesome affection. Although not an absolute cure, his plan often relieves patients for months at a time. By careful brushing with a perfectly soft brush, the dry superficial layers of the diseased skin are removed. For the first four or five days this procedure is repeated for ten to twenty minutes thrice daily; then once or twice a day; and finally once every second or third day. Baths are not advisable. At first the brushing increases the itching, but soon decided relief ensues. For the first two or three days painting the part with alcohol increases the soothing effect. At a later stage lanolin or purified lard can be applied to the skin. The author gives short notes of some of his cases.

MEDICAL JURISPRUDENCE.

UNDER THE CHARGE OF

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OBSERVATIONS BASED ON THREE HUNDRED CASES OF SUICIDE IN KIEL.

PROFESSOR HELLER, in an interesting paper, gives (*München. med. Wchnschr.*, 1900, No. 48) the results derived from three hundred cases of suicide which came under his notice in the Pathological Institute of Kiel. This number of cases is too small to enable any general conclusions of statistical value to be drawn from them, but at the same time they have been so carefully tabulated and investigated by Professor Heller, that they are of very considerable interest. Of the total three hundred cases, two hundred and thirty were males, and seventy were females.

In regard to the ages of the suicides, the figures present the same features as are found in other statistics on the subject, namely, that as age increases the number of cases of suicide also rapidly increases; this is especially noticeable amongst males. Amongst females the rapid increase in the suicide rate commences at an earlier age, and this is shown in the present statistics, where forty-one terminated their lives before the thirtieth year, and only twenty-nine at subsequent ages. One girl under 10 years of age committed suicide.

With reference to the modes of suicide employed, the results vary considerably from those recorded in this country, as the following table shows :

Mode of Death.	Male.	Female.
Hanging	127	20
Drowning	23	29
Shooting	55	2
Stabs and cuts	9	2
Poison	14	15
Run over	1	...
Fall from height	1	1
Strangulation	...	1

In the cases of eleven males and three females, suicide had been attempted by more than one method, and the following list of the combinations resorted to is interesting. One man drank sulphuric acid, and then drowned himself; another shot himself in the head and in the breast; a third stabbed himself in the breast and in the abdomen; a fourth cut his throat, then tried to shoot himself, and finally hanged himself; a fifth shot himself during the forenoon in the ear, and then hanged himself in the afternoon; a sixth killed himself with two revolver shots; a seventh made incisions across both wrists, cut off his penis, and then hanged himself; an eighth made an incised wound over the left wrist, and hanged himself; a ninth cut his throat, and also slashed himself freely in the forearm; a tenth swallowed two large needles, of which one was found perforating the duodenum, and the other the stomach—he subsequently hanged himself; the eleventh shot himself in the head, recovered, and then, some years afterwards, shot himself again in the breast.

One woman drowned herself after making incised wounds in both wrists; while two women drowned themselves, both after attempted poisoning, one with petroleum, and the other with creosote. The poisons used, in order of frequency were: phosphorus, morphia and opium, arsenic, cyanide of potassium, oxalic acid, the mineral acids, and sulphonal.

With reference to the time of the year in which the suicides occurred: 125 took place in the four months, April, May, June and July; eighty-two during August, September, and October and November; and ninety-three in the remaining months of the year. These figures correspond with those of other statistics. The author was unable to classify the causes for the act, and he deprecates ascribing it to the ostensible and immediate cause without taking into account, what is more important, the predisposing influences which may have been at work, a correct knowledge of which is in the majority of cases difficult to obtain. In the post-mortem examinations, however, which he carried out on all the cases, he was struck by finding a very considerable proportion suffering from acute febrile disease, namely—

Miliary tuberculosis	12 cases.
Enteric fever	7 „
Inflammation of the lungs	9 „
Recent endocarditis	7 „
Acute suppurative tonsillitis	12 „
Acute enlargement of the spleen	31 „
Total	78

Equal to 24·3 per cent.

He was able to trace the effects of chronic alcoholism in 143, or 47·6 per cent., and this was probably less than the actual number of those who had been given to alcoholic excess, since well marked changes are not produced in the tissues until after the lapse of some time. In the large majority of cases, changes were found in the central nervous system and coverings of the brain: these consisted in hyperostosis and sclerosis of the skull, chronic meningitis and hydrocephalus in various stages, one or other of these conditions existing, sometimes alone

but often combined, exostosis on the inner surface of the skull, pachymeningitis, softening of the brain, etc. etc. Of special interest, amongst the females, was the fact that seven were found to be pregnant, and no fewer than twenty-five were menstruating—that is to say, nearly the half of all the females were in a physiological state which is known to produce an abnormal psychological condition.

In summing up his results, Heller is of opinion that in at least 43 per cent. of all the cases the individual could not be regarded as of sound mind, and fully responsible for her action at the time the deed was done. Looking to the results which the author has obtained from an examination of these cases of suicide, he strongly advocates a compulsory post-mortem examination in all instances, not so much with a view to investigate questions of medico-legal interest, but rather to determine the presence of pathological conditions.

THE EXAMINATION OF THE NAILS OF THE HAND AS A MEANS OF DETERMINING WHETHER A PERSON IS RIGHT- OR LEFT-HANDED.

DR. MINAKOW (*Vrtljschr. f. gerichtl. Med.*, Berlin, 1900, Heft 4) has continued and extended the investigations of Dr. Regnault, which were given in a paper read before the Paris Anthropological Society in 1898, upon this subject. Dr. Regnault measured the nails of one hundred right-handed, and five left-handed persons, and arrived at the following results:—In right-handed persons, the nails of the right hand are broader than those of the left; in left-handed persons, on the other hand, the nails of the left hand are broader than those of the right. The breadth of the nails increases in those who are employed in manual labour. The nails as they increase in breadth also become flatter. Dr. Minakow carried out a careful examination of the nails of 278 persons, including thirty-seven students and doctors, 240 soldiers, two left-handed male servants, twenty-six newly-born children, and three other young children. Of the 240 soldiers, twelve were left-handed; while of the thirty-seven students and doctors, two were left-handed. The chief conclusions he arrived at may be stated shortly as follows:—In right-handed persons, the nails of the right hand are broader than those of the left, whereas the opposite is observed in left-handed persons. In persons who are ambidextrous, the corresponding finger nails in both hands are, as a rule, equally broad. Exceptions to the above rules are generally due to previous disease of the nails, which have thus been deformed, and hence, in many right-handed persons, the sum of the breadth of the nails of the right hand may be found smaller than that of the nails of the left hand. In adults, as well as in the fœtus, the nail of the thumb is the broadest, and the nails of the rest of the fingers occupy the following order as regards their breadth—middle-finger, fourth finger, index finger, small finger. The nails of the right hand, in right-handed persons, are usually somewhat less curved than those of the left hand, the opposite holding good in left-handed persons, while the greatest flattening is observed in the nails of the index finger and thumb. The flattening of the nails depends upon the nature of the physical employment of the individual, that is to say, the greater or less pressure to which the terminal phalanges have been exposed.

The author is of opinion that the above facts may have considerable medico-legal importance, as an aid in deciding whether a certain person was right- or left-handed.

OBSERVATIONS UPON THE DISTRIBUTION OF THE BLOOD IN BODIES
WHICH HAVE BEEN EXPOSED TO THE ACTION OF HEAT.

DR. FRITZ REUTER (*Friedreich's Bl. f. gerichtl. Med.*, Nürnberg, 1900), in continuation of his study of the histological changes caused in the sexual organs by exposure to heat, publishes an interesting paper upon post-mortem blood displacement through the action of heat. In his first paper, he showed that when a piece of tissue was exposed to the action of considerable heat, the part directly acted upon became anæmic and dry, while the portion of tissue furthest removed from the heat became at the same time congested and more succulent; in other words, the distribution of blood in the tissue was materially changed by the action of the heat. The importance of this fact from a medico-legal point of view is at once apparent if it holds good, not only for the blood contained in small portions of tissue, but also for the blood in the body as a whole. The author has had the opportunity of subsequently observing six cases of death by burning in which the bodies were more or less charred, and the results of his observations are contained in the present article. As regards the effect upon the surface of the body, it was found that the skin and subjacent textures, and those parts which had been directly acted upon by the heat, were pale, anæmic, and dry, whereas those parts which had escaped the direct action of the flame were congested, the vessels being full of blood and the tissues more succulent. A similar displacement of the blood in internal organs and tissues was also found, and the author satisfied himself that, in consequence of the action of heat, blood might be driven, for example in the neck, from the large vessels into the heart, thus causing a post-mortem filling of the cavities of this organ with blood, and producing a condition, therefore, which, in certain circumstances, might cause the death to be attributed to sudden heart failure or syncope. In the lungs also, when the thoracic cavity had been opened into, so that the heat was able to act directly upon them, a displacement of blood from the superficial parts may take place, causing an appearance of anæmia and dryness in these portions, and of marked congestion and greater succulence towards the interior and roots of the lungs.

In the same way, in other organs, if heat acts directly upon them, similar displacements of blood may be produced. If, however, the organs are protected by the intact walls of the cavities in which they are placed, charred skin being a bad conductor, such post-mortem displacements of the blood do not take place. In cases of severe burning, the abdominal organs frequently present a marked anæmic appearance, even when the abdominal walls have remained intact; this condition is not due to post-mortem displacement of the blood, the organs being moist and showing no signs of the action of the heat, and the author attributes it to a vital action, namely, to a spasmodic contraction of the vessels, due to stimulation of the splanchnic nerve. If the person dies at once, this condition of anæmia will as a rule be present; should, however, death be postponed for

a time, and the shock be recovered from, then no marked anæmia may be present. One is therefore entitled to infer, where such marked anæmia is present, that death has taken place rapidly. The author sums up in the following two conclusions:—(1) Under the influence of heat, displacement of the blood which is still fluid may occur post-mortem, causing changes in its distribution in the body and even extravasations of blood into the tissues. Such changes, while usually localised to the parts directly acted upon by the heat, may, however, affect the internal organs, more especially the lungs and heart; in the latter, a diastolic fulness of the cavities may thus be produced post-mortem, and this condition must not therefore be regarded as necessarily indicating death from sudden cardiac failure. (2) Anæmia of the abdominal organs is probably a condition arising during the last moments of life, caused by a reflex stimulation of the splanchnic nerves, and is not to be attributed to distension of the vessels of the skin and consequent sinking of blood pressure.

THE IDENTIFICATION OF BLOOD CORPUSCLES IN BLOOD STAINS.

Dr MOSER (*Vrtljschr. f. gerichtl. Med.*, Berlin, 1900, Heft 4) advocates the following method as a means to enable us more readily to identify the corpuscles in blood stains. If the blood stain is still moist, he employs the solution advocated by Kaiserling for the preservation of pathological preparations, which, however, is slightly modified by him, namely, formalin, 5·0; liq. potass. acet., 5·0; potass. nitr., 2·0; aq. dest., 250·0. The elements of the blood retain their form in this fluid for a long time, and also are easily stained in it by a watery eosin solution. The substance to be examined is mixed with the above solution in the proportion of 1 to 4, and after a time a drop of the mixture is placed upon a microscope slide; to this is added some eosin solution, and the whole is then protected by a cover-glass and examined. If evaporation is prevented by sealing the edges of the cover-glass, the staining is prolonged and becomes more effective. This method supplies an easy and reliable means by which we can recognise, in a certain manner, the presence of blood corpuscles, and also render their structure and characteristic forms visible.

In the examination of dry stains the above method is not applicable, and the author recommends that such stains should be treated with a mixture of equal parts of ether and alcohol, this solution being allowed to act upon the stain for from half to two hours, according to its thickness. After this, a small portion of the stain, be it on linen, wood, paper, etc., is detached in as thin a layer as possible and placed in the solution which Kaiserling has also suggested, but in which the amount of acetate of potash is slightly reduced by Dr Moser, namely, water, 100; liq. potass. acet., 10·0; glycerin, 20·0. The substance is placed in a drop of this solution and spread out in as thin a layer as possible, upon a microscope slide, with the addition of some eosin solution. It is then covered with a cover-glass and examined.

The staining solution should be allowed to act for some time, and Dr. Moser states that by this method blood corpuscles are easily recognised in all cases where they are present. He claims that the staining

of the corpuscles has the advantage of preventing blood corpuscles being mistaken for other similar objects; thus fat cells are not stained; while mould spores are also for the most part unaffected by the stain. The success of the method is not dependent upon the age of the stain, provided that it has not been previously exposed to influences which tend to alter the composition of the blood.

CHRONIC COPPER POISONING AMONG ARTISANS.

DR. KURTH (*Med. Rec.*, N. Y., Nov. 10, 1900) calls attention to the increase in cases of chronic copper poisoning in the United States, owing to the enormous growth of manufactures, and also points out the fact that at present the condition is not readily diagnosed, while its treatment is anything but rational. He states that cases are abundant at the Edison General Electric Works, and it is from these that the material for the article has been largely drawn. The class of workmen amongst whom cases of copper poisoning occur are those working in copper, or more commonly its alloy, brass. It was among brassfounders that the disease first received attention. To-day brassfounders form but a small percentage of brassworkers; fully as numerous are the solderers, and these men are very quickly affected; other brassworkers, such as filers, turners, stampers, grinders, and platers, are all more or less slowly affected. The most dangerous employment, however, is that of the finishers or polishers, the buffing wheel used in polishing causing the air to be filled with fine particles of copper dust. The metal enters the system by both the alimentary and respiratory tracts, and produces locally an irritant action, and constitutionally acts as an agent promoting waste in the blood and tissues.

The copper is probably stored up in the form of an albuminate, but is constantly undergoing elimination by the liver, the kidneys, salivary and intestinal glands, and, to some extent also, by the skin. In the respiratory tract the irritant action predominates, and causes intense congestion of the nose, pharynx, larynx, trachea, and bronchi, and after a time renders the lungs specially susceptible to pathogenic organisms, especially tubercle bacilli. The arthritic diathesis frequently found among lead-workers is not found amongst copper-workers, and it differs also from lead poisoning inasmuch as the kidneys do not appear to be commonly affected.

Eczema of a persistent character is common in all parts of the body, such as the face, back, or wherever there is persistent local perspiration. The hair is often coloured green, especially noticeable in men whose hair has already turned white. The linen is regularly coloured green, due to particles of copper dust coming in contact with the perspiration, and is in no sense a green perspiration. A green line on the teeth, due to a staining of the tartar, is not to be found in persons who use a tooth-brush freely. Anæmia is found in all cases, and the complexion is markedly sallow. The author states that he knows of no class of men who are so intensely nervous as copper-workers; their restlessness is without limit; in their homes they are irritable and excitable, and they show various nervous manifestations. Jaundice does not seem to be more frequent in copper-workers than in other employments. Emaciation is

a typical symptom of the disease, and is not confined to the cutaneous fat, but extends also to the muscular tissues. The author sums up the symptoms which are of greatest value in the recognition of cases of copper poisoning, namely, first, dyspepsia; second, anæmia; third, nervousness and irritability; add to these the fact that the patient works in copper and brass, and, he states, you cannot be mistaken. The prognosis is uniformly good, when organic changes have not taken place, and when change of occupation can be effected. The treatment should of course be prophylactic and tend to the prevention of inhalation of copper dust. If marked symptoms of poisoning are present, it will be best for the workman to change his employment. Iodide of potassium is practically useless, and in fact there is no specific remedy for the condition.

[A recent paper by Lewin (*Deutsche med. Wchnschr.*) on the same subject is directly opposed to the view that copper produces any effect upon workers in it. Very large quantities may produce acute symptoms, due to its acting mechanically or chemically on the mucous membranes with which it comes in contact, but such effects pass off quickly and leave no after effects. There is no such thing as chronic poisoning from copper. So-called cases of chronic copper poisoning are probably due to other metals present in the copper, or to other conditions of the employment, such as bad hygienic surroundings.]

DISEASES OF THE EAR, NOSE, AND THROAT.

UNDER THE CHARGE OF

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MALIGNANT DISEASE OF THE LARYNX.

It will not be out of place at this time to carefully examine some of the more recent literature bearing upon the subject of malignant disease of the larynx, including under the term malignant disease both carcinoma and sarcoma. Examination of the medical journals of to-day shows that a lively interest is maintained in this subject, an interest which is certainly demanded by the great clinical importance of the disease. Attention will be drawn here mainly to two points—diagnosis and prognosis after operative interference. Accurate and early diagnosis is essential, and upon it mainly rests the question of prognosis. When the word cancer is employed in the following pages, it must be understood as being synonymous with malignant disease.

An anatomical rather than a pathological classification of malignant disease of the larynx should be employed, a basis which is not always sufficiently recognised. The subdivision of laryngeal cancer into extrinsic and intrinsic is one of great clinical importance. By extrinsic,

we mean the attachment of the growth to the epiglottis, the aryepiglottic folds, the inter-arytenoid fold, and the cartilaginous framework of the larynx; the disease is intrinsic when it grows upon the false vocal cords, the true cords, the ventricles of Morgagni, and from the larynx below the cords. There is a marked clinical distinction in relation to this anatomical classification, which is of undoubted therapeutic value. Intrinsic cancer is of slower growth, and is more of a local disease, the lymphatics only becoming affected late in the affection, while the extrinsic form is of shorter duration and spreads more rapidly to neighbouring parts, the lymphatics becoming involved at an early period. The importance of these facts is better appreciated when the subject of treatment is under discussion, but ignorance of them may lead to errors in diagnosis. It is unfortunate that cancer of the larynx does not present any one sign that would make an accurate diagnosis possible in every case. Notwithstanding the work done by Semon in this connection, with the consequent advance in our knowledge of the clinical features of an early case of disease, we still meet with difficulties. At the Twenty-Second Annual Congress of the American Laryngological Association, held in May 1900, Noland Mackenzie makes an appeal for a more careful and fuller consideration of all the clinical facts connected with the case, and urges that the symptoms and local appearances should be most thoroughly weighed before resorting to other means of diagnosis. Semon, in his clinical picture, lays stress upon a simple congestion of one vocal cord, more especially if this is accompanied or followed by some tumefaction. When impaired mobility of the cord exists, it is a suspicious sign, depending upon the infiltrating character of the growth; further, the snowy-white appearance of the tumour with surrounding hyperæmic zone, and the pointed character of the individual projections of the papillomatous mass, form a suggestive contrast to the pinkish shade and more rounded appearance seen in true benign papillomata. Turning again to Mackenzie's paper, we find that he tabulates, in the order of practical usefulness and importance, the three following principal methods of diagnosis—(1) the naked-eye method, or diagnosis by direct inspection, supplemented by clinical phenomena; (2) thyrotomy; (3) the microscope: of the three methods, he adds that the second is often included in the first. In other words, in order to give the naked-eye method its full measure of usefulness, a thyrotomy may be performed for diagnostic purposes. When laryngoscopic examination either leaves a reasonable doubt as to the true nature of the disease, or fails to define its extent, then division of the larynx and direct inspection is justifiable. This of course is undertaken on the distinct understanding that the surgeon may proceed at once to such treatment as he deems advisable, should he consider the condition to be malignant. This procedure, it will be observed, is to be carried out before attempting to appeal to the microscope for a solution of the difficulty. If, after opening the larynx, there still remains the faintest trace of uncertainty, are we, asks Mackenzie, justified at this stage in removing a portion of the growth for examination? is partial extirpation of the tumour even admissible, even for the purpose of microscopic diagnosis? Only as a measure of the very last resort, is his answer to this question. The objections which he urges against the removal of tissue are—(1) that it subjects the patient at

once to the dangers of auto-infection at the point of incision, and to metastasis elsewhere; (2) that it stimulates the local growth of the cancer; and (3) that the method is often inconclusive, misleading, and sometimes practically impossible. The moment the continuity of the growth is broken, in that very moment is opened the pathway for self-poisoning, and an unfavourable influence is at once exerted on the local process. Mackenzie's views on this question are based upon a sad experience, and he looks back appalled at the cases of laryngeal cancer which have been maltreated in this way. His views on this point are certainly not shared by a very large number of laryngologists, who not only recommend but practise the removal of portions for diagnostic purposes. It is difficult to accept the first two objections which are advanced by him. With the methods now at our disposal for the preparation of microscopic specimens, it is unnecessary to delay a radical operation for more than a few days after the preliminary removal of a portion of the growth, so that in so brief a span of time little if any risk is incurred, and the cancerous growth has not time to make headway. With regard to the inconclusiveness of the microscopic test, as mentioned in his third proposition, it is interesting to observe what has been said by others for and against it. At the Twelfth International Congress, held in Moscow in 1897, there was considerable expression of opinion on this point. When the clinical symptoms and signs are in favour of cancer, and the histological examination gives a negative result, the clinical aspect of the case must be considered of greater value than the microscopic result. On the other hand, provided that the microscopist is a man of experience, an histological examination revealing cancerous tissue should outweigh all negative clinical evidence. It is possible for the portion removed to appear of a simple nature, when the growth is in reality malignant; the piece may not be of sufficient size, and it may not include the whole thickness of the growth. But the portion removed may prove the malignant nature of the tumour when the surgeon is otherwise in doubt, and therefore it is a procedure which should be undertaken in such cases. Both Chiari and Krause concluded that it was the only thoroughly reliable means of diagnosis. At the Thirteenth International Congress, held in Paris, B. Fränkel affirmed that microscopical examination was of fundamental importance in the diagnosis of laryngeal cancer, while Moritz Schmidt stated that when other means failed there should be a small piece excised for microscopic purposes. The first-named authority cautioned the observer against basing a positive diagnosis merely upon epithelial processes, continuous with the surface and passing into the deeper parts of the tissue. It is perhaps hardly necessary to refer here to the use of iodide of potassium, and to a careful examination of sputum, for the purpose of excluding syphilis and tubercle. These are included in the general clinical features of the case. In spite, therefore, of Mackenzie's plea against this diagnostic procedure, we must sum up in its favour. Early diagnosis is essential for successful treatment, and in doubtful cases nothing should be neglected which will render this possible. In addition to this important factor, we must also duly recognise how favourably treatment and consequently prognosis are influenced by the great improvements which have recently been made in operative technique.

It is impossible in a brief résumé of this kind to do more than merely name the operations which are practised for the removal of the malignant disease of the larynx. These are—(1) the endo-laryngeal operation; (2) thyrotomy; (3) partial excision; (4) complete excision of the larynx. Subhyoid pharyngotomy may be referred to in passing. With regard to the choice of operation, we must refer the reader to the remarks already made on the subdivision of the disease into the extrinsic and intrinsic forms, and again emphasise the necessity of placing each case in one or other category, recognising the fact that the disease may exist in both situations. In thyrotomy, or laryngo-fissure, we have an operation which, through the valuable and instructive writings of Semon and Butlin, is becoming more extensively employed than formerly, and which, in *intrinsic* cases of the disease, is followed by very satisfactory results (Semon, *Monatschr. f. Ohrenh.*, Berlin, November 1899; Butlin, "Operative Surgery of Malignant Disease," London, 1900). Semon points out how, by the intralaryngeal method, too little is done; while total extirpation, on the other hand, means in many cases doing too much. Facts and experience show that in thyrotomy we have a valuable intermediate course in many suitable cases. Mackenzie, in the paper which we have already quoted, appeals for much more radical measures than can be satisfied by a simple thyrotomy. He considers that there is only one rational method in the majority of cases of dealing with malignant disease of the larynx, and that is by total extirpation of the entire organ, with its tributary lymphatics and glands, whether the latter be apparently diseased or not. So long as there are lymphatics to carry the infection, and glands to receive it, so long will the patient be subjected to ultimate danger. In other words, he seeks to apply to this organ the same surgical principle which governs the treatment of cancer elsewhere in the body. After perusal of the writings of Semon and Butlin, and after considering the statistics of thyrotomy, which they submit, it is difficult to support the sweeping measures advocated by Mackenzie in all cases, when an early intrinsic laryngeal cancer is the point at issue.

The subject of statistics must be considered under two heads: first, recovery from the operation; and, secondly, recovery from the disease. The term "cure" implies that no recurrence has been observed three years after the operation. When an attempt is made to compare statistical tables, considerable difficulty is encountered, as in many instances no differentiation is made between the intrinsic and extrinsic varieties, and in compiling tables there is not always sufficient discrimination made between cases operated upon, before and during the last decade, that is to say, before and after the introduction of improved technique. We shall, in the first place, consider Semon's statistics on thyrotomy (*Monatschr. f. Ohrenh.*, Berlin, November 1899) for intrinsic cancer, drawing attention to this fact, that in two of the cases a portion of one arytenoid cartilage was also removed. The cases occurring in his private practice and operated upon by himself were fifteen in number. The mortality from the operation was one. This patient was *æt.* 72, and had suffered from chronic bronchitis for twenty years. He died six days after the operation. With regard to the question of recurrence and cure, the appended table shows the very satisfactory results ob-

tained. Only ten are quoted, because of the fifteen one died after the operation, one had only been operated upon three months before, in one the growth was certainly benign, whilst in another there was some doubt as to its nature, and the fifth possibly showed evidence of recurrence.

Malignant Disease.	Living after Operation without Recurrence.			
Case 1	8	years and 5 months.		
„ 2	7	„ „ 4	„	
„ 3	4	„ „ 5	„	
„ 4	3	„ „ 8	„	
„ 5	3	„ „ 2	„	
„ 6	3	„ „ 3	„	
„ 7	2	„ „ 5	„	
„ 8	1	„ „ 4	„	
„ 9	1	„ „ 4	„	
„ 10	1	„ „ 3	„	

With the exception of Case 5, which died suddenly from embolism, all the other patients are alive and in good health. None of them are wearing a cannula. In six the voice is excellent; two speak with a husky, weak voice, which, however, is better than it was before the operation; one, who had both vocal cords completely removed, can make himself understood in a whisper. The mortality from the operation in Semon's cases is therefore 6·6 per cent. In his experience, if recurrence has not taken place one year after the primary removal of the disease, it is then as little likely to do so as after the lapse of three years. Hence the ten cases tabulated may be regarded as “cures,” thus giving Semon the excellent percentage of 83·3 successful results after thyrotomy.

If we turn now to Butlin's statistics (*op. cit.*) after the same operation, we find that he and Semon, prior to and including the year 1896, had performed thyrotomy seventeen times for intrinsic cancer, and two deaths followed the operation—one due to sepsis, the other to bronchitis. Since 1896 they had lost no case from the operation, having performed thyrotomy ten times. The diminution in the mortality is considered by Butlin to be due to the improved methods and to better after-treatment, such details as the immediate removal of Hahn's tube, frequent changing of the dressings, and care in feeding, being responsible for the results. With regard to the question of “cure,” sufficient time had not elapsed to permit him to tabulate his results in this connection since 1896, but at the date of publication of his book, 1900, no deaths had so far occurred. These figures, therefore, show clearly enough that, in the hands of Semon and Butlin, thyrotomy has furnished very successful results in the treatment of malignant disease of the larynx.

Sendziak, whose labours in the compilation of statistics in this field of work have been enormous, has again furnished us with a large series of facts and figures (*Monatschr. f. Ohrenh.*, Berlin, September 1899). His investigations have allowed him to tabulate the operative results in 640 cases. The statistics cover two periods of time—first, from earliest times to 1888; secondly, from 1888 to 1898, but excluding the year 1898. Further, the statistics are considered under five different headings—(1) cure, that is, no recurrence three years after the operation;

(2) relative cure, that is, no recurrence one year after the operation ; (3) recurrences ; (4) deaths immediately dependent upon the operation (within the first fortnight) ; (5) cases observed for too short a period to permit of any definite statement being made concerning them. If we examine some of his figures in the second period, that is, when earlier diagnosis and improved technique are playing their important parts, we find that after thyrotomy there are fewer deaths following the operation than are found after complete excision, 6·6 per cent. as compared with 14·2 per cent. Further, many more cases are cured after thyrotomy, 11 per cent. ; after complete excision, 1·5 per cent. With regard to recurrences, it is true that the percentage after thyrotomy is higher than that after complete excision, 16·2 per cent., as compared with 11·2 per cent., but we have no facts to show whether certain of the cases treated by thyrotomy might not have been partially extrinsic in character.

PUBLIC HEALTH.

UNDER THE CHARGE OF

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DUST AND TUBERCULOSIS.

MM. TOSTIVINT and REMLINGER (*Rev. d'hyg.*, Paris, tome xxii. No. 10) draw attention to the difference in incidence of tuberculosis among the Arabs, Europeans, and Jews, in Tunis.

The health statistics of the French army show that the Arabs have a distinct predisposition to this disease. In the civil population, during five years 1895-1899, there were 13,151 deaths among the Mussulman Arabs, of which 1017 were due to tuberculosis ; and among the European population there were 5820 deaths, of which 231 were due to tuberculosis ; while among the Jews, of 2744 deaths, only 34 were due to tuberculosis.

Taking the best statistics of population available, we have the following as a tuberculous mortality among the different races :—

Mussulman Arabs		11·3 per 1000
Europeans		5·13 „
Jews		0·75 „

Race immunity may be excluded as between Arabs and Jews, as they are both Semitic. The conditions of living as regards housing, clothing, and nutrition are very similar among the different races. But while among the Arabs and Europeans the houses are invariably dry swept, in the houses of the Jews, rich and poor alike, the floors, walls, staircases, etc., are moistened before being swept, or else cleaned with a wet cloth. The authors consider this the cause of the comparative rarity of tuberculosis among the Jews. Recently the method of moist sweeping has been made compulsory in the military barracks at Tunis.

FEEDING OF INFANTS.

HESSE (*Ztschr. f. Hyg. u. Infectiouskrank.*, Leipzig, Bd. xxxv. Heft 3) discusses the composition and preparation of an artificial substitute for woman's milk, and the results obtained by its use.

When entirely prepared in the household, the following is the method of procedure:—Supposing 2 litres milk to be the daily consumpt, then $4\frac{1}{2}$ litres of fresh cow's milk contained in a flat dish is kept in a cool place for $1\frac{1}{2}$ hours, and the upper layer to the amount of $\frac{3}{4}$ litre skimmed or poured off. (Such cream contains about 9 per cent. of butter fat.) This creamy fluid is made up with water to 2 litres. The entire contents, yolk and white (weighing, as a rule, 60 grms.) of an average sized hen's egg is mixed with 84 grms. milk sugar (previously sterilised at 140° C.), and the resulting thick emulsion is spread on a greased plate and kept at a temperature of about 40° C. until it thickens and becomes firm. This is divided into eight parts. 250 c.c. of the mixture of cream and water is put into the feeding bottle and warmed, and one of the eight portions above referred to is added. To avoid some of the trouble of preparation, Pfund of Dresden supplies the mixture of egg and milk sugar ready made in the form of a powder in packets, each packet being sufficient for 50 c.c. of the cream and water. The resulting fluid has a composition nearly the same as average woman's milk. Detailed records are given of the results of feeding infants with this artificial milk as compared with cow's milk, raw and sterilised, etc., and he concludes that better results are obtained by this "egg milk" than with those.

Rotch and Townsend each contribute a paper (*Boston Med. and Surg. Journ.*, October 1900) on the use of various modified milks, that is, lacteal fluids with quantities of fat, albuminoids and sugar different from those in woman's milk. They are prepared either from top milk (that is the upper quarter of the bulk of milk set in a cool place for about eight hours to throw up its cream) which, according to Townsend, contains, as a rule, 10 per cent. butter fat, or, as recommended by Dr. Rotch, with separated cream. Dr. Rotch lays great stress on the exact percentages of the different constituents as an essential to the successful use of such milk substitutes, and considers that such accuracy can only be obtained in milk prepared in special milk laboratories.

Dr. Townsend urges the advantages of home modified milk, and gives the following method:—Each ounce of 10 per cent. cream, mixed with 19 oz. of water, gives a fluid containing 0.5 per cent. fat, 0.2 per cent. albuminoids, and 0.2 per cent. of milk sugar, and an even tablespoonful of milk sugar added to this raises the amount of the latter to 2 per cent. With 8 oz. of such top milk, 11 oz. of water, 1 oz. of lime water, and two and a half tablespoonfuls of milk sugar, a fluid is obtained containing 4 per cent. fat, 6.6 per cent. milk sugar, and 1.6 per cent. albuminoids, which approximates to the composition of human milk (the albuminoids being low). In cases of difficult digestion it is almost always desirable to lower the amount of fat and albuminoids. The nutritive value of the mixture can be greatly increased by adding raw white of egg. One oz. of top milk, 18 oz. of water, and 1 oz. of lime water, with one and a half tablespoonfuls of sugar of milk, gives a fluid 0.5 per cent. fat, 3.2 per cent. milk sugar, and 0.2 per cent. albuminoids.

The white of one or two eggs may be added to this to increase the nutritive value, and such a fluid will be retained when a large amount of milk would not be.

CERTIFICATION AND CLASSIFICATION OF DIARRHŒA DEATHS.

DIARRHŒA is one of the "principal of zymotic diseases" of the Registrar-General, and a very important one, as is seen from the fact that during ten years 1886-1895, 24·7 per cent. of the deaths under this heading were due to diarrhœa and dysentery. Accuracy in the classification of such deaths is therefore of the greatest importance, and this can only be attained if a general agreement be arrived at as to what names may be used in designating this disease, so that deaths registered as due to any of these causes may be included by the Registrar-General under the heading of diarrhœal diseases.

In the supplement to the Fifty-fifth Annual Report of the Registrar-General of England and Wales, we find "the deaths, included in these tables under the head of Diarrhœal Diseases, are those which have been returned by the registrars under one or other of the following designations—diarrhœa, dysentery, intestinal or gastro-intestinal catarrh, cholera or choleraic diarrhœa," deaths from gastro-enteritis, enteritis, and gastric catarrh are put under definite and separate headings. Dr. Ballard, in his report on summer diarrhœa, includes among his synonyms of diarrhœa, both enteritis, muco-enteritis, and gastro-enteritis, and considers that many of the deaths in the epidemic season certified as due to marasmus, atrophy, want of breast milk, etc., are really due to that disease.

The Incorporated Society of Medical Officers of Health appointed a committee to consider the matter, and as a result of their inquiries among nearly 600 medical officers of health and others in Great Britain and Ireland, "they were forced to the conclusion that the classification of diarrhœal deaths is at the present time in such a state of hopeless confusion as to render the statistics of diarrhœa deaths, and consequently of zymotic death-rates in different localities, quite misleading, and altogether useless for comparison," and "that this confusion is mainly due to the unnecessarily numerous names employed by medical men to designate one and the same disease in their death certificates."

The investigations of Ballard and others lead to the conclusion that epidemic or summer diarrhœa is a disease of specific nature as much as cholera or enteric fever, and hence has a right to have a specific and well-defined name, instead of being designated by what is merely a characteristic symptom. The Royal College of Physicians of London, later, appointed a committee, of which Dr. Tatham of the Registrar-General's Office was a member. He pointed out that the age incidence, fatality curves, and general epidemiological characteristics of the diseases certified as gastro-enteritis, muco-enteritis, and gastric catarrh, entitle them to be regarded as identical with epidemic diarrhœa. In London, for example, during July, August, and September, 1900, there were 3798 deaths certified as due to diarrhœa, and 2289 deaths due to enteritis, of which 1880 were due to gastro-enteritis, the bulk of which certainly

ought to be attributed to epidemic diarrhœa. Local fashion seems to some extent to determine the nomenclature employed. In England and Wales, the diarrhœa death-rate among children under one year of age is twenty-five per 1000 births, the enteritis death-rate is twelve per 1000 births. In East Yorkshire the rates are thirty-five for diarrhœa, and nine for enteritis.

The committee found that there was a widespread objection on the part of medical practitioners to employ the term "diarrhœa" in certifying the cause of death. In the public estimation, this term is generally held to imply a disease insufficient to cause death, and its use in the death certificate might be conceived to imply a stigma on the capacity of the medical practitioner. They recommend the College to authorise the use of the term "epidemic enteritis," or, if preferred, "zymotic enteritis," as a synonym for epidemic diarrhœa, and that the terms gastro-enteritis, muco-enteritis, and gastric catarrh be entirely discontinued.

The Registrar-General, acting on this decision of the Royal College of Physicians, has issued the following instructions to district registrars of births and deaths:—"Diarrhœa. This should be registered as the cause of death only when diarrhœa is written alone or when it is coupled with some ill-defined cause, such as atrophy, debility, marasmus, thrush, convulsions, teething, old age, or senile decay. In addition to deaths ascribed to diarrhœa, deaths from intestinal or enteric catarrh, from gastro-intestinal or gastro-enteric catarrh, or from epidemic enteritis, or zymotic enteritis must be included under the heading; but deaths from gastric catarrh, gastro-enteritis or enteritis, must be excluded from this heading."—*Pub. Health*, London, vol. xiii., No. 1.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH OBSTETRICAL SOCIETY.—*January 9, 1901.*—Dr. MILNE MURRAY, President, in the chair. SPECIMENS.—Dr. J. W. BALLANTYNE showed a “Scheme of Fœtal Growth.”—Dr. HAIG FERGUSON showed a “Fibroid Uterus removed by Abdominal Hysterectomy.”

COMMUNICATIONS.—Dr. HAULTAIN read a paper on “Intraperitoneal Rupture of Simple Ovarian Cyst with special reference to Operative Treatment,” which appears in this number of the Journal.—Dr. BERRY HART read a paper “On Uterine Retraction, with special reference to the Mechanism and Management of the Third Stage of Labour.” He showed first that the Credé method of delivering the placenta was not nearly so much in favour as formerly, and argued that, therefore, the belief that the separation of the placenta was due to uterine contraction, and retraction should now no longer be held; for if it were, then the Credé method was the only natural treatment in every case. Our knowledge of the condition was based on two forms of uterus. One found after death during labour, which he called the “intact uterus,” and the other that which was removed from the living subject in Porro’s operation, the Porro uterus. This latter, being removed from its surroundings, was no longer to be regarded as physiological and as a basis for finding out what actually occurred in natural labour. Hence our only source of reliable information was the “intact uterus,” as seen in frozen sections. Although retraction existed to a certain extent in all frozen sections, yet the uterine muscular wall was invariably thinner opposite the placental sites. This, therefore, was not what one would expect to find, if the theory of separation during contraction were entertained. Uterine retraction corresponds to the amount of thickening which the muscular wall retains after a pain has passed, and therefore after contraction and the elastic recoil which succeeds it. After discussing elastic recoil, Dr. Hart proceeded to reaffirm his view that the placenta is separated between the pains while this recoil is occurring, not during the pains, as has been previously held by some. From this he deduced that scientific management of the third stage should be purely expectant. If the hand be kept on the anterior abdominal wall at all, it is to be regarded only as a precautionary measure, and is not to be used for the active compression of the uterus as a means of *separating* the placenta.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—*January 16, 1901.*—Mr. A. G. MILLER, President, in the chair.—Dr. GRAHAM, for Mr. CAIRD, showed four cases of gastro-enterostomy and also preparations from two cases of vesical calculus.—Dr. D. C. WATSON showed microscopic slides illustrating the comparative pathology of ataxia.—Dr. DAWSON TURNER showed an improved Röntgen apparatus.—Dr. F. D. BOYD read a paper on the Edinburgh Hospital in South Africa, with notes on the work. He first showed several magic lantern slides illustrating the working of the hospital, after which Dr. G. CHIENE showed slides of several surgical cases, and Dr. MILLER read a few notes on the X-ray apparatus used in the hospital. Dr. Boyd then gave a short

sketch of the medical work. Speaking first of typhoid fever, he mentioned that diarrhœa was seldom present, constipation being the rule. The mouth was usually very foul, probably because of the unavoidable neglect during the several days occupied in transit. True pneumonia never occurred as a complication, but in 15 per cent. of the cases hypostatic congestion occurred. Thrombosis was common, occurring in 6 per cent. of the cases. It came on late in the disease, its earliest occurrence being on the twenty-sixth day. In one case, the middle cerebral was thrombosed, causing hemiplegia and aphasia. He could offer no satisfactory explanation of the frequency of thrombosis. Relapse occurred in 5.3 per cent. of cases, which was a low percentage; there was no mortality from relapse. Cases were classified as (1) Abortive—lasting eight to ten days; (2) Grave—gastro-intestinal symptoms predominating, extensive ulceration post-mortem; (3) Toxæmic—rash well marked, nervous symptoms predominating; (4) Apyrexial—no temperature, but typical rash and typical stools. In ten typical cases Widal's test gave no reaction, though the test was applied two or three times. Simple continued fever is probably not a distinct disease, but was unrecognised typhoid, dysentery, malaria, or influenza. In regard to antityphoid inoculation, fifty-eight members of the staff were inoculated, and of these nine developed typhoid and one died of cardiac failure. It appears to modify the severity of the disease in some cases. It may permanently affect the general health. Dysentery was common, but amœba coli was rarely found. An affection known as soldier's heart was frequently met with. It consists in a dilatation of the right side of the heart, apparently due to heavy marching and hard work.

GLASGOW MEDICO-CHIRURGICAL SOCIETY, *January 11, 1901.*—Dr. WALKER DOWNIE showed a variety of polypi removed from the nasopharynx. As regards treatment, Dr. Downie recommended removing the polypus by means of a snare, and about a week later freely cauterising the base of the polypus and the surrounding parts to prevent recurrence.—Dr. NEWMAN gave a short account of three cases of renal hæmaturia—(a) From thrombosis in a case of movable kidney; (b) from torsion of the renal veins in a case of movable kidney; (c) from a malignant tumour of the kidney. Dr. Newman gave an account of a case of jaundice due to a large impacted gall-stone. A swelling could be felt in the region of the gall-bladder, but no gall-stones had been passed. An incision was made over the gall-bladder, and a large calculus removed by crushing. The gall-bladder was stitched to the abdominal wall, and a drainage tube inserted.—Dr. FREELAND FERGUS described a new operation for ptosis (congenital). An incision is made along the line of the eyebrow, and the skin is separated up over the forehead for about 2 in. A vertical strip about $\frac{1}{2}$ in. broad is cut in the occipito-frontalis muscle, and divided at its insertion into the orbital margin. The knife is then passed down into the eyelid, and the strip of muscle is stitched to the ciliary margin.

GLASGOW PATHOLOGICAL AND CLINICAL SOCIETY, *January 14, 1901.*—Dr. ALEXANDER ROBERTSON in the chair.—Dr. NAPIER exhibited three patients, a sister and two brothers, the subjects of hypertrophic cirrhosis

of the liver, with splenic enlargement (Hanot's disease). The patients, æt. respectively 22, 21, and 16½, were all slightly jaundiced, and showed marked enlargement of both liver and spleen. The interesting feature of the ailment was its occurrence in members of a family. Dr. Napier also showed a girl, æt. 6, in whom marked Jacksonian epilepsy had disappeared under the administration of iodide and bromide of potassium. Five months previously she had fallen over a banister, but Dr. Napier was not of opinion that there had been any definite injury to the head.—Dr. FINLAYSON gave a bibliographical demonstration illustrative of physiognomy, and especially the physiognomy of disease.—Mr. E. MAYLARD showed—(1) A specimen of a prolapsed rectum removed from a woman, æt. 54, by Mikulicz's method. The prolapse had existed for twenty years, and at time of operation measured 6 in. in length by 9 in. in circumference at its base. The operation had had a successful result. (2) A specimen of ruptured small intestine resected from a man, æt. 25, who had been crushed between two lorries.—Dr. E. A. GIBSON showed two specimens of uterine myomata removed by operation.

FORFARSHIRE MEDICAL ASSOCIATION.—*December 13, 1900.*—Dr. C. S. YOUNG, Vice-President, in the chair.—Dr. MACKIE WHYTE read a paper "On Recent Researches on Alcohol and their Effect on Treatment," which will appear in an early number of the Journal.

OBITUARY.

FRANK MOREWOOD WIGG, M.B.

THE prevailing gloom has, for the Royal Infirmary, been deepened by the death of Dr. F. M. WIGG. Born and educated in Australia, he came to Edinburgh six years ago to enter on the study of medicine, and at once showed himself to be a man of great promise. After passing through his curriculum with much distinction, he held for a few months the office of Resident Medical Officer at the Norfolk County Asylum, and last October entered on his duties in the Royal Infirmary as Resident Physician. During their performance he became infected by acute pneumonia in one of its most serious forms, and after a week's illness he succumbed, on 23rd January.

Frank Morewood Wigg was a man of the highest character. Cherishing lofty ideals of duty, and possessed by rare enthusiasm for knowledge, his example was a stimulus to those amongst whom he lived, while his kindly nature and unselfish disposition rendered him as beloved as he was respected. The hopes centred in him have been rudely shattered, and the world rendered poorer by his premature death.

Few words are needed to express the sorrow of the nation in the profound bereavement it has just sustained. Nowhere is that grief greater or deeper than in the world of Medicine. Our late beloved QUEEN, throughout her long reign, manifested so much interest in every scientific advance, and so thoroughly identified herself with every effort to lessen human suffering, as to enshrine herself in a peculiar degree in the hearts of all to whom the relief of disease is sacred. During the Victorian Age scientific discoveries have been made, in a degree never before witnessed even in the era of Pericles. To all these the Queen gave the encouragement of her royal favour. But above all, Her Majesty was instinct with sympathy for every scheme having as its aim the alleviation of pain and woe. She was thus led to link herself with the great medical movements of the time by lending to them the lustre of her name, by manifesting her true womanly feeling for them, and even by suggesting directions in which the streams of benevolence might be led to flow. It will never be forgotten that, when, at the two Jubilees, large sums were ready to commemorate in some way her people's thankfulness for her long and beneficent sway, Her Majesty indicated her desire that the funds should be devoted to the service of the sick. As one aspect of a richly endowed and many-sided nature, this characteristic trait of Her Majesty's life may fitly receive our gratitude and admiration.

MONTHLY NOTES ON METEOROLOGY AND VITAL STATISTICS.

By A. LOCKHART GILLESPIE, M.D., F.R.S.E., F.R.C.P.Ed.,

MEMBER SCOTTISH METEOROLOGICAL SOCIETY.

METEOROLOGICAL MEANS FOR THE EAST OF SCOTLAND DISTRICT, FOR THE FIVE
WEEKS ENDING DECEMBER 29, 1900; AND FOR THE YEAR FROM JANUARY 1.

	TEMPERATURE.			RAINFALL IN INCHES.		SUNSHINE. HOURS.		Mean Daily Variability of Temperature.
	Mean.	Accumulated Day-Degrees.		Actual.	Accumulated from Jan. 1.	Actual.	Accumulated from Jan. 1.	
		Above 42°.	Below 42°.					
Mean . {	37°·4	1* 45°	163°	3·5	32·0	38	1275	3°·2
Observed {		2 2362°	919°					
	42°·4	1 98°	80°	5·3	37·2	30	1159	2°·64
Difference {		2 2324°	889°					
	+5°·0	1 + 53°	— 83°	+1·8	+5·2	— 8	— 116	+0°·56
		2 — 38°	— 30°					

VITAL STATISTICS.

MORTALITY IN FOUR LARGE TOWNS IN THE EAST OF SCOTLAND (EDINBURGH, DUNDEE, ABERDEEN, AND LEITH), DURING DECEMBER, AND SINCE JANUARY 1, 1900. Actual Numbers and Rate per 10,000 per annum.

	TOTAL.		CONSTITUTIONAL DISEASES.		CIRCULATORY SYSTEM.		RESPIRATORY SYSTEM.		NERVOUS SYSTEM.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1898 {	1 1315	227·4	218	37·7	119	20·6	323	55·7	136	23·5
	2 13605	196·0	2643	38·1	1271	18·4	2675	39·0	1526	22·0
Actual Deaths and Rate per 10,000 {	1 1097	189·8	234	40·6	102	17·7	217	37·4	129	22·3
	2 13363	192·5	2805	40·4	1354	19·6	2467	36·0	1510	21·8
Difference from Mean {	1 - 218	-37·6	+16	+2·9	-17	-2·9	-106	-18·3	- 7	-1·2
	2 - 242	-3·5	+162	+2·3	+83	+1·2	-208	- 3·0	-16	-0·2
	DIGESTIVE SYSTEM.		URINARY SYSTEM.		PNEUMONIA.		PHTHISIS.		CANCER.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1898 {	1 78	13·6	30	5·2	111	19·4	105	18·3	51	8·8
	2 909	13·1	352	5·1	1009	14·6	1300	18·7	607	8·7
Actual Deaths and Rate per 10,000 {	1 73	12·7	29	5·1	97	16·9	106	18·4	68	11·7
	2 944	13·6	371	5·3	1143	16·5	1338	19·2	666	9·5
Difference from Mean {	1 - 5	-0·9	-1	-0·1	-14	-2·5	+ 1	+0·1	+17	+2·9
	2 +35	+0·5	+19	+0·2	+134	+1·9	+38	+0·5	+59	+0·8

* NOTE.—The figures ¹ denotes the data for December, ² for year to date.

December meteorologically was an extraordinary month. It was warmer than any December for many years back, probably the warmest since 1857, although in 1898 the mean temperature was not very far below its figure. The rainfall was 51·4 per cent. over the average; sunshine was deficient, and the mean daily variability of temperature largely decreased. An excess of 53 day-degrees above 42° Fahr., and a deficit of 83° below that point, were recorded, an aggregate of 136° in increased warmth for the period. In addition, the mean wind pressure registered reached to a higher value than previously recorded for the month, *i.e.* 3·66 lb. on the square foot, an increase of 1·75 lb.

The values for the whole year, with a mean temperature practically normal, yield only a slight difference between the deficit of warm and cold day-degrees, showing 8° in favour of decreased warmth. The year, therefore, with some lack of warm weather, had also less than the average of pronounced cold. The absence of any low temperatures in December contributed largely to this result. The total rainfall was 5·2 inches or 16·25 per cent. over the normal, increases having been recorded in eight months of the twelve; the only deficit of any note occurred in September. In eight months also there was a deficiency of bright sunshine; the total decrease of 116 hours for the year forming 9·09 per cent. of the normal. The mean daily variability of temperature for Edinburgh exceeded the average in seven, fell below it in four, and coincided in one month.

Turning to the mortality returns, because of a green Yule-tide, not in despite thereof, the total number of deaths registered was 16·5 per cent. below the mean; all causes of deaths noted above participating in the decrease, except constitutional diseases, phthisis and cancer. Deaths from respiratory diseases were unprecedentedly diminished, 32·8 per cent. below the normal average; those from pneumonia falling 12·6 per cent. Circulatory diseases caused 14·2 per cent. fewer deaths, digestive 6·4 per cent., and nervous 5·1 per cent. Equally marked was the 33·3 per cent. increase under cancer. Influenza caused six deaths directly.

The following table shows the variations per cent. of the normal totals expected, from the means for 1899 and 1900.

	Per Cent.			Per Cent.	
	1900.	1899.		1900.	1899.
Total deaths	- 1·7	- 2·2	Digestive diseases . . .	+ 3·8	+ 13·0
Pneumonia	+ 13·2	+ 5·8	Phthisis	+ 2·9	± 0
Cancer	+ 9·7	+ 19·8	Nervous diseases . . .	- 1·04	+ 1·3
Circulatory diseases . .	+ 6·5	± 0	Respiratory diseases . .	- 7·7	- 14·9
Constitutional diseases .	+ 6·1	+ 6·9	Pneumonia per cent. of re-		
Urinary diseases	+ 5·4	- 4·6	spiratory	+ 8·6	+ 9·1

The values speak for themselves. The contrast between pneumonia with the highest rate of increase, and respiratory diseases with the greatest deficit in 1900, is remarkable. Influenza was returned as the direct cause of death in 332 instances, practically two-thirds of these in January and February.

Between 1900 and 1899 increased rates are shown under total pneumonia, circulatory, urinary, respiratory and phthisis deaths; decreased under cancer, constitutional, digestive, and nervous diseases.

If the pneumonia deaths be taken from the total respiratory cases, the decrease in the respiratory remainder equals 20·5 per cent. in 1900, compared with 28·4 per cent. in 1899.

ANALYTICAL REPORTS.

OPHTHALMIC TABLOIDS OF EUPHTHALMINE.

WE have received from Messrs. Burroughs & Wellcome, and tested, some of the tabloids of Euphthalmine, which that firm manufacture for introduction into the conjunctival sac. The drug is in the form of the hydrochloride, $\frac{1}{40}$ gr. in each tabloid, a strength which is sufficient to ensure a considerable if not complete dilatation of the pupil. The tabloid dissolves immediately on application to the conjunctiva, producing a slight and extremely transitory sensation of heat, and the pupil rapidly begins to dilate. One great advantage which the drug has is that it is believed to act scarcely at all upon the ciliary muscle; its employment thus incommodes a patient very slightly; of course this greatly negatives its use in refraction work by those who hold that the accommodation must be entirely paralysed. Enthusiasts state that Euphthalmine does not increase the tension of the eye, but this is probably because it has not as yet been sufficiently widely used. Neither does atropine, neither does cocaine, nor any mydriatic until it is applied to the eye of a person liable to glaucoma. Any mydriatic is dangerous in such a case, and we have no doubt whatever that Euphthalmine is so as well as others. The absence of this dangerous quality, if real, is probably due to the rapid evanescence of its effect. Any surgeon who employed Euphthalmine in an eye threatened with glaucoma, relying on this claim made for it, would probably find that he had committed a grave error.

HEALTH COCOA.

(H. Thorne & Co., Leeds.)

HEALTH COCOA is undoubtedly a pure cocoa, unmixed with starch, gum, or other similar bodies, and from which the excess of fat has been removed. An analysis which has been sent with it, gives it the following composition:—

Fat	.	.	.	.	35·43
Albuminoids	.	.	.	.	19·68
Cellulose, starch, etc.	.	.	.	.	31·47
Theobromine	.	.	.	.	1·98

This result is very satisfactory, and when milk has been added to it, in the course of preparation for use, points to a most nutritious compound. Boiling water or hot milk may be used at discretion, sugar and cream to taste, and the result will be found very pleasant to the palate. From practical observation, the flavour of "Health Cocoa," properly prepared, is delicious and clean, and altogether it appears to be second to none in the market. Although alleged to be the cheapest, we cannot offer any opinion on this point, as no mention of the price has been vouchsafed to us.

EDINBURGH MEDICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

PSYCHOSES FOLLOWING PELVI-ABDOMINAL OPERATIONS.

By J. HALLIDAY CROOM, M.D., F.R.C.S.Ed., F.R.C.P.Ed., *Consulting Physician, Royal Maternity Hospital; Gynæcologist, Royal Infirmary, Edinburgh.*

THERE is no novelty whatever in discussing the question of mental disturbances succeeding operations of all kinds. There is scarcely any form of operation which, in persons so predisposed, may not lead to a total upset in the nervous system, and bring on psychical changes more or less marked. Such aberrations occur after operations in general surgery, even after such a minor accident as a simple fracture. After the administration of anæsthetics, delirious mania has followed, and in some cases weak-mindedness has lasted for a very variable period. Abdominal and pelvic surgery is no exception, of which the cases to which I am about to refer are sufficient indication. The normal functions of the uterus and ovaries are themselves not unassociated with mental aberrations; alterations in the temper, for instance, or actual hallucinations, disordered appetites of all kinds, are accompaniments both of menstruation and pregnancy. The same is the case with the menopause. That of course is a natural process, and yet is only too frequently associated with all sorts of forms of nervous and mental disturbance. Perhaps of the three conditions—menstruation, pregnancy, and the menopause—the menopause is more frequently associated with curious mental phenomena than any other period of a woman's life. Such aberrations are associated with the normal utero-ovarian conditions.

Every one is acquainted with the frequency of insanity occurring after ordinary labour, of which the asylum records bear ample testimony, but it must be admitted that puerperal insanity generally occurs in those in which the patient's record has not

been a clean one, where there has been insanity or mental weakness, either in the case of the patient herself previously, or in her parents, or in the collateral branches of the family. Of course I am not concerned with the question as to the advisability or propriety of operating upon mentally diseased women, or women with neurotic inheritance. The prognosis in such cases is serious. The tendency to rouse up morbid mental tendencies in such people by operations is, of course, very serious, and therefore in such women operations of convenience, which are not necessary for the prolongation of life, ought to be undertaken very guardedly indeed. Before going further, let me give an illustration of a case of mental disturbance, associated with menstruation, in an otherwise healthy woman with a good history, unassociated with any operative interference whatever.

CASE 1.—The patient was a young unmarried girl, *æt.* 26, and the complaint was, that she had for long exhibited symptoms of violent dislike to her relatives, especially her brothers and sisters, during the five days that her catamenia lasted. She was morose during the whole period, declined to speak to any member of the family, and was violently insulting when spoken to ; but the day after her catamenia ceased she was bright, cheerful, and well, and willing to enjoy all the pleasures of life. This had lasted for ten years. She has been on more than one occasion examined carefully under chloroform, and no morbid condition whatever could be found in the uterus and adnexa. She had no dysmenorrhœa. Her sisters are all healthy and well, and there is, so far as could be ascertained, no history of any insanity in the family. This case seems to be one in which there must be some peculiar idiosyncrasy in the patient, which is associated with nothing apparently abnormal in the pelvis, with no displacement, neoplasm, or lesion in either the uterus or its appendages. But the interesting point of the case is, that she married two years ago, and shortly after marriage she became pregnant, and was delivered at full time, but during the whole period of her pregnancy she had exhibited symptoms similar to those she showed during menstruation, but shortly after delivery she became perfectly well, and has remained well since, though menstruating regularly.

It is unnecessary here to refer to mental conditions during normal pregnancy ; they are very well known and recognised, and one would pass from these which might well be called "normal neuroses," to those which are associated with pelvic or abdominal operations.

The following case is interesting, inasmuch as one cannot imagine any class of case that is so disappointing to an operator as this, in which the whole advantage and benefit of the operation is destroyed and misunderstood, on account of this mental distress.

CASE 2.—A young woman, a widow, *æt.* 32, was admitted into a nursing-home—under my charge—suffering from villous endometritis, with profuse hæmorrhage, not only at her menstrual periods but inter-

menstrually as well. On examination, the uterus was found much enlarged and easily hæmorrhagic. The obvious treatment was to perform curettage. This was accordingly done, and the patient made an excellent recovery. Some weeks afterwards she took an inordinate dislike to her own child, threatened to murder it, and she is now an inmate of an asylum.

Here again is a distinctly disappointing *result*. In this case the diagnosis was obvious, and the cure absolutely complete, and yet the case ended more disastrously than if the patient had died of acute sepsis. Such a case impresses one with the importance of regarding in their estimate of the danger of an operation the fact that it may be followed by mental changes as serious as the one just referred to.

The following is another case of mental trouble consequent upon a minor gynæcological operation:—

CASE 3.—The patient in this instance, a young lady, æt. 25, was brought to me *reduced to a state of extreme anæmia*, suffering from constant and profuse uterine hæmorrhage, dependent upon the presence of a uterine polypus. This is not the place to discuss the nature of the operation necessary, but it will be allowed that the removal of a tumour such as this, about the size of a hen's egg, involves no very great shock to the system. Such operations are performed every day, and are, so far as either immediate or remote results are concerned, entirely satisfactory. Of course the hæmorrhage ceases at once, and the only possible risk is septic absorption, and this can be easily prevented. This lady made an extremely good recovery, and left the home perfectly well. There has been no return of the hæmorrhage since. Unfortunately, two months after the operation, she harboured the delusion that she had been delivered of a child, and that she had become, as a result, an outcast, and she is now the inmate of an asylum.

This is a result which no one can discount, and cases such as this, where the patient was reduced to a state of profound anæmia, and where the physical cure was an absolutely complete one, are, it must be admitted, a disappointment. So far as one could discover, this girl had no family history of insanity whatever, either in her immediate family or among her relatives, and this is the point one would emphasise. It may be readily understood how the extraction of a tooth or the administration of chloroform would upset the nervous system of a person pronouncedly so predisposed, but this is a case where there was no tendency to insanity in the family whatever. I repeat that this fact seems to be a very serious addition to one's views as to the prognosis of any case. As has just been said, all are prepared to discount accidents in insane families, but one has no right to discount—one is not expected to discount—such accidents as these in women who have a perfectly clean mental history. It might be possible to account for this case by the fact that the girl was reduced to profound anæmia. She was exsanguine in the extreme, and therefore it is possible

that an operation undertaken under such circumstances might have produced a comparatively great shock, but then the symptoms did not come on for at least two months after the operation was performed, and by that time the patient had become physically stronger in every way. At the same time, when one regards the curious mental and physical phenomena that are from time to time seen in conditions—perfectly normal conditions—such as menstruation, pregnancy, lactation, and menopause, it is not a matter for very great surprise that, when, in addition, operative interference is had recourse to, the effect on the nervous system should be pronounced, as in the case just recorded. It might be supposed that the insanity occurring two months after the operation was neither in consequence of it nor related to it, but the nature of her delusion is a sufficient answer to this objection.

The influence which the ovaries and uterus exert over the mind has long been discussed in the abstract, and on that account one is all the more anxious to record concrete examples illustrative of these conditions, in order that others may be prepared for them as they occur. It is not for me to inquire into why this takes place, nor to go into any erudite examination of the relation between mind and matter; it is enough to point out that such accidents are possible, and at the same time, unfortunately, utterly and absolutely unpreventable.

Before leaving the subject of minor gynæcology, one other case might be quoted.

CASE 4.—The patient, a young woman of an exceedingly healthy family, suffered from intense spasmodic dysmenorrhœa, which had resisted all the ordinary drugs, and which was so severe as to withdraw the girl from active duties every month. On one occasion her suffering was so severe that she had to have chloroform administered. After due consultation with her friends, the cervix was dilated, and for the two succeeding months she was quite free from her dysmenorrhœa; but at the third month it returned, and she became violently maniacal, and her mental equilibrium has been very much upset ever since, so much so that her marriage has had to be abandoned.

It is unnecessary to multiply cases of mental changes following minor operations, but one could mention others, though fortunately less pronounced and attended with happier results than those just cited. Though *I have not myself* seen any cases of insanity after perineal repair, yet Kelly records six cases of insanity after perineal operations, and one of these died in acute mania.

When one comes to pass from minor to major operations, of course the field is wider, and in the following example it will be found that mental and fatal conditions are by no means unassociated with the major operations in gynæcology. The case is as follows:—

CASE 5.—The patient was a married woman, apparently in robust health, with a simple ovarian tumour. There were no adhesions and no

difficulty whatever in the operation, which lasted ten minutes. It went off without a hitch of any description, and the prognosis was therefore perfectly favourable. To show how careful one ought to be, I might mention that, after the operation was over, the husband asked if there was any necessity for him to remain in Edinburgh. The answer was in the negative; he was told that his wife was perfectly well, and there was no likelihood of any hitch occurring, and he left for a distant part of the country. The following day the patient became acutely maniacal, had to be held down in bed, and died of exhaustion in four days.

Of course it will probably be said that this was the mania or the delirium of sepsis, but, as a matter of fact, the autopsy showed not a trace of sepsis anywhere. The patient had no family history of insanity, and was apparently in excellent health. Here, again, one does not wish to enter upon any abstruse investigation as to how this calamity occurred, but the fact remains that the patient died in acute mania four days after the simplest possible operation. Reference might here be made to the excellent paper by Kelly on this subject, in which he records eight cases out of something over 2000 abdominal sections. The record from which these cases are taken shows five cases of insanity in over a thousand sections. Of Kelly's eight cases, five recovered completely, two remained insane, and one committed suicide. My record obviously is not so satisfactory.

The case just referred to is one of acute mania, following a simple operation. Take another case:—

CASE 6.—The patient had a rather troublesome ovariectomy performed. There were numerous adhesions, but the case, though somewhat tedious, was nothing unusual. She made an excellent recovery, and remained absolutely well for five days. On the morning of the seventh day, when the stitches were removed, the wound had completely healed except for one small suppurating stitch hole. The same evening she became excited. The next day she was still more so, and a day later she became acutely maniacal, and remained so for a week, when she had to be removed from the home. She died shortly afterwards.

CASE 7.—Perhaps one of the most painful cases was that of a patient upon whom I performed hysterectomy for a large rapidly growing fibroid. It is unnecessary to mention the operative details; suffice it to say that the stump was treated intraperitoneally, and dropped back into the abdomen. The tumour was a large one, involving a wound nearly from the ensiform cartilage to the pubis. Afterwards she was apparently well, without any notable rise of pulse or temperature. On the night of the seventh day, after the stitches had been removed, while the nurse had left the patient just for a minute, the patient jumped out of bed, tore off the dressing, and before she could be brought back to bed the strapping had given way. This allowed the wound to re-open at its lower margin, and a small portion of the gut escaped. I saw her very shortly afterwards, and found her in a state of violent excitement. It was with difficulty that she was anæsthetised. I was fortunately able

to deal with the temporary hernia, and she recovered from the operation, but only to become an inmate of an asylum, where she still is.

These cases all illustrate mental disturbances occurring immediately after an operation.

CASE 8.—The next one is a case of melancholia, which supervened six months after the performance of a simple ovariectomy. The case was a perfectly easy one, without any complications. The patient made an excellent recovery, but six months afterwards began to show symptoms of dislike to her friends, along with evidences of suspicion and melancholy, and she is now, and has been for some time, confined in an asylum.

The interesting feature of all these cases is, that all those mental disturbances occurred after operations which were uncomplicated and simple, and in cases where the operation *per se* was entirely successful, and further, that all occurred in women who, so far as could be traced, had no hereditary tendency whatever in that direction. There is little reason to doubt that septic infection has a great deal to do in the production of insanity after operations.

Of course, in looking for causes that lead to these mental disturbances after operation, the field is very wide.

Undoubtedly the first factor is the hereditary one; the second possibility is sepsis; and from these two, which are probably the main causes of post-operative insanity, one can look to a large group occurring under loss of blood, defective action of the kidneys, and so forth.

Again, one must remember that in removing the ovaries for disease (or from other cause), one induces the climacteric, and of course in so doing one places the woman in all the possible risks of climacteric trouble. It seems probable that the essential prerequisite for the development of post-operative insanity must be, in all cases, a neurotic organisation, predisposed, from either hereditary taint or acquired nervous weakness (and instability), to take on diseased (or perverted) action, in consequence of any active disturbing influence.

Naturally, all are unwilling to admit that sepsis is the cause of death in operations, for now we know that a septic death means careless surgery, and therefore some are apt to attribute deaths and misfortunes to other causes than the real one. For example, death is said to be due to shock, defective kidney action, hæmorrhage, exhaustion from suffering, the depressing effect of anæsthetics, vomiting—to anything rather than to actual sepsis. Still, in the cases here referred to, with the exception of the hysterectomy, the possibilities of sepsis were out of the question altogether, at least of any sepsis that showed itself by any other way than by the insanity.

Alienists tell us that there does not exist a psychosis which

may be called post-operative insanity. With the exception of certain operations on the head, thyroidectomy, etc., there are no operative procedures which can be said to be *solely* productive of mental troubles, and the main rôle in the production of post-operative disturbances is played by a predisposition, acquired or hereditary.

I think the remarkable thing, however, is that it has not been shown that insanity is more common after operations on the genital organs than after operations on any other organs. When one recognises the frequency with which mental troubles are apparently associated with the *normal* occurrence of changes—such as puberty, menstruation, pregnancy, and the menopause—it may be considered almost remarkable that women escape from these disorders as easily as they do.

One does not wish here and now to enter upon the great subject of operations undertaken in insane women, with a view to effecting a cure of the mental disease, by operative treatment of the genital organs. That is a field in which there is a good deal to be said, but it seems to me that under no circumstances ought any insane woman to be operated upon, unless for some distinct condition which is compromising life. The cases in which the ovaries have been removed, and other operations performed, with a view to influencing insane or hysterical conditions, are many, and I fear the results are exceedingly discouraging. One's own experience of hystero-epilepsy is comparatively limited. I have operated on only one case where the symptoms were extremely marked, and after the removal of the ovaries the catamenia ceased, and the hystero-epileptic symptoms disappeared; but after some years the patient was lost sight of, and therefore I cannot tell whether or not the cure was absolutely complete. It is quite certain that after any degenerative processes have occurred in the brain cells, it is absolutely useless to look for any mental cure by any form of operations on the genital organs.

The relation of gynæcology to psychiatry has been much discussed in late years, and I think the general consensus of opinion, gathered from alienists and neurologists alike, is that, while it has a place amongst the insane just as among the sane for the relief of physical distress, yet as a great curative method in the treatment of insanity it plays a comparatively small and unimportant part.

ON THE FORMATION OF CRYSTALS, DENDRITES, AND SPIRAL STRUCTURES, IN RELATION TO GROWTH AND MOVEMENT, ESPECIALLY RHYTHMIC MOVEMENTS.

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THE distribution and movements of atoms and molecules in the universe, especially that part of it forming the organic kingdom, is of the utmost importance in biology and physiology. No one, so far as I know, has succeeded in giving a satisfactory explanation of them.

Atoms and molecules, there can be little doubt, move and are moved, and arrange themselves under the operation of a First Cause, as represented by life and physical force—gravitation, attraction, repulsion, changes of temperature, condensation, rarefaction, osmose, etc.¹

Atoms and molecules for the most part display a tendency to dispose themselves in straight lines or in curves, the curves forming circles and spirals, especially the latter. As a consequence, growth and development in the organic and inorganic kingdoms proceed in one or other of the directions indicated.

The straight-line formations produce bodies bounded by plane surfaces; the curve formations producing spheres and spiral structures and modifications thereof. The straight-line formations are represented by crystals of every form and variety, crystallites, and dendrites; the latter branching and assuming a characteristic tree

¹ In the present communication, the operation of a First Cause, in everything that pertains to the inorganic and organic kingdoms, is taken for granted.

Newton and Swedenborg held strongly to a First Cause.

Newton, when speaking of the formation of the sun and fixed stars, says: "I do not think (this) explicable by mere natural causes, but am forced to ascribe it to the counsel and contrivance of a voluntary agent."

In like manner, Swedenborg remarks "that nothing can be truly known of the visible world without a knowledge of the invisible, for the visible is a world only of effects, while the invisible, or spiritual, is a world of causes."

Haeckel and Tyndall reject a First Cause. They attribute everything to a power inhering in matter as matter, in virtue of which it assumes shape and movement, as apart from a Creator and as apart from life.

Kant, Herschel, Laplace, and others endeavoured to explain the existence and movements of the heavenly bodies by what is known as the nebular hypothesis. Laplace was of opinion that the matter of the solar system "existed originally in the form of a vast, diffused, revolving nebula, which, gradually cooling and contracting, threw off, in obedience to mechanical and physical laws, successive rings of matter, from which subsequently, by the same laws, were produced the several planets, satellites, and other bodies of the system."

Descartes attempted to account for the formation of the universe, and the movements of the bodies composing it, by a theory of vortices.

It will be observed that all the philosophers referred to above assume the existence of matter. It is the distribution and movements of matter, not only in the physical universe, but also in the vegetable and animal kingdoms, which is still *sub judice*.

shape. Crystals are formed by aggregations of atoms and molecules, the additions, as a rule, being made in straight lines, and giving rise to plane surfaces. The curve formations are represented by spheres and modifications of spheres, where the atoms and molecules combine to form bodies having concentric arrangements; the additions being made in successive curved layers. Beautiful examples of straight-line formations are seen in the crystals of snow, and of the straight-line and curve formations in the crystals and conglomerations of hail. In the latter, the straight-line and concentric arrangements are both present. Perhaps no better illustrations of the extraordinary plasticity and power of nature to assume different shapes and conditions, under slightly altered circumstances, can be given than are afforded by the structure of snow and hail respectively. The spiral formations of the physical universe are seen in spiral nebular arrangements, in whirlwinds and spiral sandstorms, in whirlpools and spiral waterspouts, etc. In all these cases, the atoms, molecules, and bodies concerned are arranged spirally. The straight-line, curved, circular, and spiral formations obtain also in plants and animals. The globular, rod-like, and spiral structures are seen in the very beginnings of life, and in the very lowest living forms, *e.g.* cocci, bacilli, and spiralia, measuring from the $\frac{1}{1000}$ to the $\frac{1}{2500}$ of an inch in diameter. Examples of the straight-line arrangements are met with in the stems, roots, branches, and other parts of plants. Examples of curve formations are to be seen in the concentric arrangements (rings of growth) in the stems of plants and trees; and examples of spiral arrangements occur in the twisted stems of climbing plants. Twisted stems are not uncommon also in forest trees. Trees and plants split up and branch after the manner of dendrites. They thus combine, in their structure, the straight-line and curve formations to which reference has been made.

The same thing, within limits, happens in animals. Animals are symmetric and asymmetric. A good example of a symmetric animal is the five-rayed starfish. In general configuration it greatly resembles a crystal. The body, as a whole, displays the straight-line and curve formations in combination; the diverging rays affording an illustration of the former, and the curved surfaces of the rays, of the latter.

The *Aplysia*, one of the molluscs, furnishes an example of an asymmetric animal.

The symmetric animals are in the ascendancy. In matters of symmetry they, in not a few cases, resemble crystals. They also resemble dendrites from the fact that, in a great many instances, they branch out in more or less straight lines, as witness the integumentary appendages, and the extremities and travelling organs of animals.

Animals reveal spiral formations in their bodies, as a whole, and in certain parts of their bodies. The animals inhabiting shells are almost all spiral, and quadrupeds and bipeds have spiral extremities, these being composed of spiral bones, spiral muscles,

etc. The quadrupeds have, in many cases, spiral horns. Both quadrupeds and bipeds have, as a rule, spiral hearts.

The general configuration of animals is rounded or convex, while the internal arrangements, in the majority of cases, are dendritic, *i.e.* they branch out in straight lines after the manner of trees. This holds true of the blood vessels, lymphatics, bronchial tubes, nerve cells, etc., in the higher animals. It also holds true of the respiratory, alimentary, and other systems in the lower animals.

Animals, like plants, are the products of straight-line, curve, and spiral formations. The movements in the organic and inorganic kingdoms are also in straight lines, curves, ellipses, circles, and spirals.

In the physical universe we have examples of straight-line movements when a body flies off at a tangent into space. We have examples of elliptical and rotatory movements in the earth travelling round the sun, and turning upon its own axis while so engaged. The spiral movements are seen to advantage in the whirlwind and the waterspout.

In plants and animals, the straight, circular, and spiral movements reappear. In plants, straight-line movements are seen in the upward and downward progress of branches and roots in the process of growth; in the bifurcation and growth of the stem, branches, leaves, etc. The circular movements are seen in the free ends of plants whose summits revolve; and the spiral movements in climbing plants which wind round supports, and which have for the most part twisted or spiral stems. In animals, straight-line movements are witnessed in *Pseudopodia*, which supply the most plastic and direct form of movement, also in the forward movements of worms, slugs, etc. The circular movements are seen in the *Rotifera*; the curve movements in snakes; and the spiral ones in the walking, swimming, and flying of animals. In the higher animals, the travelling organs are spiral, both as regards form and function. The same remarks may be made of the viscera of several of them, namely, the ventricles of the heart, the stomach, bladder, uterus, etc.

As regards both form and movement, plants and animals find their analogues in the physical universe; the organic kingdom is not separated from the inorganic one, unless in the matter of life. Nor will this, on reflection, occasion surprise. All the elements entering into the formation of living plants and animals come directly or indirectly from the physical universe. They also return to it at death. There is in the universe a store of matter, and a store of force, which admits neither of increase nor diminution. The organic and inorganic kingdoms are inseparably united, and there are good grounds for believing that the life in building up plants and animals, not only appropriates all the materials employed in the constructive process from the physical universe, but also a considerable proportion of the force which inheres in those materials, and which, strictly speaking, cannot be separated from them.

If the views now put forth be adopted, most, if not all, the structures and movements with which we are familiar in the organic and inorganic kingdoms fall into line. They go far to explain how the heavenly bodies are built up, and how they move and wheel in space—in tangents, ellipses, circles, spirals, etc.: how the nebulae, in some instances, form vortices; how there are eddies and whirlpools in the water; cyclones or circular storms in the air; spiral waterspouts and spiral sand-storms on sea and land, etc. They also go far to show how crystals and dendrites are formed in the inorganic kingdom; how structures, bounded by plane and curved surfaces, are produced in the organic kingdom; and how straight, curve, circular, and spiral movements in plants and animals, and parts thereof, are produced.

Movement at once precedes and follows structure, and the direction of movement in living things is, in every instance, determined by the composition and configuration of the moving part.

There are good reasons why atoms and molecules should arrange themselves, and move in straight lines and in spirals. Straight lines and spirals do not return upon themselves and admit of indefinite extensions, *i.e.* matter can be added in straight lines and in spirals to any amount, and movement in either direction has practically no limit. Those peculiarities of straight-line and spiral formations and movements are of the utmost consequence in growth and progression, especially in the locomotion of animals.

The straight-line formations are crystalline and dendritic in character, *i.e.* they form structures bounded by straight lines and plane surfaces, as in crystals; the dendrites of minerals and metals; the frost pictures seen on window-panes and pavements in winter; the lightning flash, etc.

Straight-line formations are also witnessed in the arborescent arrangements of the roots, branches, leaves, and other parts of plants, and in the branching of nerve cells, blood vessels, lymphatics, bronchial tubes, and other parts of animals.

The spiral formations and movements everywhere abound in the vegetable and animal kingdoms; in spiral growth and development; in the spiral cells, hairs, and vessels of plants; in the spiral stems of climbing plants; in the revolving movements of plants; in the spiral distribution of branches, leaves, fruits, etc.: in the spiral configuration of shells and horns; in the spiral structure and distribution of the bones and joints of the vertebrate skeleton; in the spiral formation and movements of the soft parts, especially of the voluntary and involuntary muscles, as seen in the limbs, the ventricles of the heart, stomach, bladder, uterus, etc.

In suggesting possible explanations of the distribution and movements of atoms and molecules in living plants and animals, I recognise most fully the existence of a great First Cause, as regards the creation, disposal, and supervision of matter, both in the organic and inorganic kingdoms. A First Cause may operate in two different

ways:—(a) In creating matter (inorganic or organic) and in giving it a certain rôle to perform as apart from supervision. (b) In creating matter, and in supervising every change which occurs in it.

In the former case, creation is as it were a completed work; everything infallibly working out its own destiny, according to law and order. In the latter case, creation is only in part completed—in other words, is progressive, and requires constant supervision and guidance. The first view is that adopted by many evolutionists; the second, that favoured by those who believe in separate creations.

Nothing short of a First Cause can, it appears to me, explain many of the phenomena with which biologists and physiologists have to deal. Spiral structures and movements are in special demand in the organic and inorganic kingdoms.

Stereo-chemistry has shown that “optically active substances may be divided into two classes. Some, like quartz, sodium chlorate, and benzil, produce rotation only when in the crystalline states; the dissolved (or fused) substances are inactive. Others, like oil of turpentine, camphor, and sugar, are optically active when in the liquid state or in solution. In the former case the molecules of the substance have no twisted structure, *but they unite to form crystals having such a structure*. As Pasteur expressed it, we may build up a spiral staircase—an asymmetric figure—from symmetric bricks; when the staircase is again resolved into its component bricks, the asymmetry disappears. In the case of compounds which are optically active in the liquid state, the twisted structure must be predicated of the molecules themselves, *i.e. there must be a twisted arrangement of the atoms which form these molecules*.”

Pasteur, in discussing the molecular constitution of tartaric acids, says: “That the molecular structures of the two tartaric acids are asymmetric, and, on the other hand, that they are rigorously the same, with the sole difference of showing asymmetry in opposite senses. Are the atoms of the right acid grouped on the spirals of a right-handed helix, or placed on the solid angles of an irregular tetrahedron, or disposed according to some particular asymmetric grouping or other? We cannot answer these questions. But it cannot be a subject of doubt that there exists an arrangement of the atoms in an asymmetric order having a non-superposable image. It is not less certain that the atoms of the left acid realise precisely the asymmetric grouping which is the inverse of this.” . . . “Pasteur regarded the formation of asymmetric organic compounds as the special prerogative of the living organism. Most of the substances of which the animal and vegetable tissues are built up—the proteids, cellulose—are asymmetric organic compounds, displaying optical activity.” . . . “Meso-tartaric acid contains two equal and opposite asymmetric groups of atoms within its molecule.” . . . Pasteur was of opinion that compounds exhibiting optical activity were never obtained without the intervention of life. He also says:

"Artificial products have no molecular asymmetry; and I could not point out the existence of any more profound distinction between the products formed under the influence of life, and all others. And, again, he refers to the molecular asymmetry of natural organic products as the great characteristic which establishes, perhaps, the only well-marked line of demarcation that can at present be drawn between the chemistry of dead matter and the chemistry of living matter. . . . Non-living, symmetric forces, therefore, acting on symmetric atoms or molecules, cannot produce asymmetry, since the simultaneous production of two opposite asymmetric halves is equivalent to the production of a symmetric whole, whether the two asymmetric halves be actually united in the same molecule, as in the case of meso-tartaric acid, or whether they exist as separate molecules, as in the left and right constituents of racemic acid. In any case, the symmetry of the whole is proved by its optical inactivity."¹

The well-marked tendency to spiral formations and movements, everywhere observable in the organic kingdom, has its counterpart in the inorganic kingdom. In the latter there are spiral formations and movements on a grand scale, as witness the vortices of nebulae, of air, of water, etc. Examples of these are seen in the whirlwind, the whirlpool, the water-spout, and other natural phenomena.

Examples of crystals are met with both in the organic and inorganic kingdoms. Crystals are characterised by the most exquisite symmetry, and are typical, straight-line, and plane surface formations. They are endless as regards form, and have for the most part an unvarying chemical composition. They occur in the soft snow and in the hardest rocks and metals. They are deposited in the solids of certain plants, and in the fluids of plants and animals, as witness the crystals of sugar, blood, bile, urine, etc.

Examples of dendrites occur in plants as a whole; in roots and branches; in the venation of leaves; in the branching of blood vessels, lymphatics, nerve cells, bronchial tubes, the shaggy chorion, placenta, etc. The symmetry observable in crystals is not wanting in dendrites and in plants and animals. Plants for the most part are strikingly symmetrical; and the bodies of animals are, as a rule, composed of two halves, with a tendency to right or left spiral overlapping, the overlapping half being the larger and stronger, and giving rise to what is known as right or left-handedness in ourselves.

Examples of spirals (single and double) are found in large numbers in plants and in animals—spiral cells, hairs, stems, branches, leaves; shells, horns, bones, muscles, nerves, etc. Spiral formations are symmetrical when two or four opposite spirals are employed. They are non-symmetrical or lop-sided when only one spiral is employed. Complementary spirals are by no means infrequent.

¹ "Stereo-Chemistry and Vitalism," by Professor F. R. Japp, as given in the "Report of the British Association for the Advancement of Science," 1898.

The unaccountable thing is that crystalline, dendritic, and spiral formations and movements occur both in inorganic dead matter and in organic living matter.

A hasty generalisation would naturally lead to the conclusion that there is in the universe only one kind of matter and only one kind of force. It might even be inferred that the living or organic kingdom is an outgrowth or product of the inorganic kingdom, and that vital force is a mere variety and product of physical force.

As, however, it has been satisfactorily proved that there is no such thing as spontaneous generation, a line of demarcation must be drawn as between dead and living matter, and between physical and vital force.

The question—and it is an exceedingly difficult one to answer—has still to be put: How comes it that living matter assumes crystalline, dendritic, and spiral shapes and movements? The following, it appears to me, is the only answer that can be given. Plants and animals, at the outset and during their lives, are composed of inorganic matter. All the substances which enter into their composition are taken from the inorganic kingdom. In building themselves up they appropriate not only the materials of that kingdom, but also a considerable proportion of the force which inheres in those materials. If, however, plants and animals are wholly composed of inorganic matter (plus life), and if they transfer to their bodies a considerable portion of the force which inheres in the matter of that kingdom, it need occasion no surprise if the structure and movements of plants and animals, and parts thereof, in many cases resemble the structure and movements of natural objects which never have lived or ever will live.

The universe forms a harmonious whole, and the inorganic and organic kingdoms are in no sense opposed to each other. Each plays its own important rôle, but the rôles are co-extensive, co-ordinated, and correlated.

The atoms and molecules which enter into the formation of the inorganic and organic kingdoms, as stated, naturally run in specific directions, in straight lines, curves, circles, and spirals, and the task of life is rendered comparatively easy by a preconcerted and prearranged distribution and movement of matter, whether this be solid, liquid, or gaseous.

It is the same First Cause which works in the inorganic and organic kingdoms; and the two kingdoms are, in the fullest and widest sense, complementary. They are in no degree antagonistic or opposed to each other. The earth, air, and water provide the food for the plant; and the plant, air, and water for the animal. In the *Carnivora*, animal food, prepared by the plant, is substituted; the *Omnivora* consuming plant and animal alike. Dead decaying animal matter, as is well known, enriches the soil and produces additional pabulum for plants.

The organic and inorganic kingdoms are interdependent, and

in order to realise the position of plants and animals in the universe, it is necessary to consider, very briefly, the properties of the earth, the water, and the air, and some of those physical arrangements and movements which purify the atmosphere, which enrich the soil, which supply and diffuse moisture, which provide and regulate heat, etc.

The organic substances are, so to speak, manufactured from the inorganic by plants and animals. A plant to live must be supplied with soil, with water, and air. The soil contains saline matters, to which are generally added decomposing substances, which furnish carbonic acid and ammonia. The water furnishes oxygen and hydrogen in chemical combination; and the air oxygen and nitrogen, and small but important quantities of carbonic acid and ammonia. The plant is thus supplied with water, salts, carbonic acid, and ammonia. But the plant can disintegrate the carbonic acid, and appropriate its carbon, which it can subsequently build up with oxygen and hydrogen into sugar, oil, and starch; or it can combine carbon, hydrogen, oxygen, and nitrogen to form those peculiar nitrogenous substances recently known as protoplasm. The sun lends its aid to the plant in these transformations; in fact, the heat of the sun enables the plant to separate the oxygen from the carbon and the nitrogen from the hydrogen in the formation of sugar, oil, and starch. The heat of the sun is, marvellous to relate, not lost in the process. It is stored up in the newly-formed sugar, oil, and starch; and may be reconverted into heat either by burning in the animal body or in an open fire. The heat thus obtained can, when collected, be made to perform a definite amount of mechanical work. The physical and vital forces are correlated and interact.¹ Sugar, oil, and starch are manufactured by a vital chemistry, and, when once produced, are appropriated, with other substances, as food by the *Herbivora*. and subsequently by the *Carnivora* and *Omnivora*. By vital, chemical, physical, and other forces the inorganic material of the outer world is incorporated in the organic or inner world of plants and animals.

The animal, built up, as it were, indirectly from the inorganic and directly from the organic kingdoms by means of the plant, reverses the operations of the latter. It returns to the inorganic world the substances abstracted from it by the plant. Thus the animal takes the complex bodies produced by the plant, and oxidises or burns them. It restores the carbon of these bodies to the atmosphere chiefly in the form of carbonic acid, the hydrogen as water, and the nitrogen, with the remainder of the carbon, as urea, to the soil.

While these transformations are going on in the animal body,

¹ "The life of men, animals, and plants could not continue if the sun had lost its high temperature, and with it its light."

the tissues are being built up and conserved, secretions formed, and work done. This work may be either mechanical or mental, or both. The animate and inanimate kingdoms plainly interact. The plant lays the inorganic world under contribution, and the animal lays the vegetable world under contribution; but the animal in due time restores to the inorganic or mineral kingdom, in undiminished quantity, the substances abstracted from it by the plant. In like manner, the energy displayed by the animal is to be regarded as the sum of the potential energy stored up in chemical compounds; and this in turn is restored to the outer world as heat, which, like the matter, is undiminished in quantity. There is therefore a cycle of force and a cycle of matter in living beings. "Animals, like machines, can only move and accomplish work by being continuously supplied with fuel (that is to say, food) and air containing oxygen; both give off, again, this material in a burnt state, and at the same time produce heat and work. All investigation, thus far, respecting the amount of heat which an animal produces when at rest is in no way at variance with the assumption that this heat exactly corresponds to the equivalent, expressed as work, of the forces of chemical affinity then in action. As regards the work done by plants, a source of power in every way sufficient exists in the solar rays which they require for the increase of the organic matter of their structures." "A certain portion of force disappears from the sunlight, while combustible substances are generated and accumulated in plants, and we can assume it as very probable that the former is the cause of the latter. . . . The immense wealth of ever-changing meteorological, climatic, geological, and organic processes of our earth are almost wholly preserved in action by the light and heat-giving rays of the sun. . . . In the series of natural processes there is no circuit to be found by which mechanical force can be gained without a corresponding consumption."

It is necessary to say a word here regarding the great physical law of the conservation of energy. This law resolves itself into three parts, namely, the conservation of energy, the transformation of energy, and the dissipation of energy. We have examples of the conservation of energy in physiology, wherever we have mechanical or physical adaptations which produce a maximum of work with a minimum of power.¹ We have examples of the transformation of energy in the muscles moving the bones, or the heart the blood; and we have examples of the dissipation of energy in the friction accompanying the movements of both bones and blood. In all the vital, physical,

¹ "There is hardly a natural process to be found which is not accompanied by mechanical actions, or from which mechanical work may not be derived—heat, electricity, magnetism, light, chemical forces, all stand in manifold relation to mechanical processes. . . . While the steam-engine develops for us mechanical work out of heat, we can conversely generate heat by mechanical forces."—Popular Scientific Lectures by Helmholtz, 1873.

and chemical actions and reactions the law plays a prominent part.

The interaction of the physical, chemical, and vital forces is thus expressed by Helmholtz: "If a certain quantity of mechanical work is lost, there is obtained an equivalent quantity of heat, or, instead of this, of chemical force; and, conversely, when heat is lost, we gain an equivalent quantity of chemical or mechanical force; and again, when chemical force disappears, an equivalent of heat or work; so that in all these interchanges between various inorganic forces, working force may indeed disappear in one form, but then it reappears in exactly equivalent quantity in some other form. . . . The universe possesses, once for all, a store of force which is not altered by any change of phenomena, can neither be increased nor diminished, and which maintains any change which takes place on it. . . . The force of falling water can only flow down from the hills when rain and snow bring it to them. To furnish these we must have aqueous vapour in the atmosphere, which can only be effected by the aid of heat, and this heat comes from the sun. The steam-engine needs the fuel which the vegetable life yields, whether it be the still life of the surrounding vegetation, or the extinct life which has produced the immense coal deposits in the depths of the earth. The forces of man and animals must be restored by nourishment; all nourishment comes ultimately from the vegetable kingdom, and leads us back to the same source. . . . We are thrown back upon the meteorological processes in the earth's atmosphere, on the life of plants in general, and on the sun." It would appear from this that living force can generate the same amount of work as that expended in its production.

The link which binds the organic to the inorganic, and the living to the non-living, is protoplasm in one form or other. This mysterious life stuff apparently provides the bridge which connects the inorganic and organic kingdoms. The approaches to this bridge are numerous, but, unfortunately, not altogether satisfactory or safe. Haeckel says: "The homogeneous, viscid, plasma substance which singly and alone formed the bodies of the first organisms, and even at this day quite alone forms them in the case of the *moneres*, or simplest amœbic forms, is analogous to the tenacious and viscid planetary substance which contains the elements and substance of the young earth, as well as of the other glowing world bodies." Herbert Spencer, one of the most advanced thinkers of the present day, avers "that the chasm between the inorganic and organic is being filled up, and that organisms are *highly differentiated portions* of the matter forming the earth's crust and its gaseous envelope." In like manner, Huxley, also in the vanguard of science, states "that protoplasm can originate only in that into which it dies—the elements—the carbon, hydrogen, oxygen, and nitrogen of which it is found to

consist. Hydrogen, with oxygen, forms water; carbon, with oxygen, carbonic acid; and hydrogen, with nitrogen, ammonia. Similarly, water, carbonic acid, and ammonia form, in union, protoplasm. . . . Protoplasm, then, is but an aggregate of physical materials, exhibiting in combination—only as was to be expected—new properties. . . . All vital action whatever, intellectual included, is but the result of the molecular forces of the protoplasm which displays it.”¹ Protoplasm, according to Huxley, is the formal basis of life. “It is the clay of the potter, which, bake and paint it as he will, remains clay, separated by artifice, and not by nature, from the commonest brick or sun-dried clod. Thus it becomes clear that all living powers are cognate, and that all living forms are fundamentally of one character.” Huxley regards protoplasm as identical in composition and uniformly diffused in plants and animals; *i.e.* not contained in cells. In this he differs from the German histologists, who still regard the cell as the precursor and parent of protoplasm. With them “there is as yet no matter of life; there are still cells of life.” Huxley claims for protoplasm a threefold unity—a unity of faculty, a unity of form, and a unity of substance. Each of these positions has been disputed, and properly; for how, say Huxley’s opponents, can there be unity of substance if the elements, carbon, oxygen, hydrogen, and nitrogen, which constitute the protoplasm, are combined in varying quantity in different kinds of protoplasm? If there is not unity of substance there cannot be unity of form, and if there is neither unity of substance nor of form there cannot possibly be unity of function. The unity of substance of protoplasm depends for its proof mainly upon ultimate organic analysis. Ultimate organic analysis, however, teaches next to nothing in such cases. “Ozone is not antozone, nor is oxygen either, though in chemical constitution all are alike.” Further, some protoplasm, in addition to carbon, oxygen, hydrogen, and nitrogen, contains a certain proportion of sulphur; and the Germans have shown that the cells which produce protoplasm contain in some cases glycogen, in others cholesterine, in others protagon, and in others myosin. According to Stricker, protoplasm varies almost indefinitely in consistence, in shape, in structure, and in function. In some cases it is fluid, in others semi-fluid, in others firm and resisting. Occasionally it is club-shaped, bottle-shaped, spindle-shaped, branched, prismatic, polyhedral, etc. One kind produces fat, another pepsine, another pigment. There is a protoplasm for each of the tissues—nerve, brain, bone, muscle, etc. There is, further, a protoplasm for the several kinds of plants and animals, each producing its own kind.

¹ Huxley, as epitomised by J. Hutchison Stirling, LL.D., to whose able critique on “Protoplasm” the reader is referred.

(To be continued.)

ON THE PROGNOSIS OF ACUTE DISEASE.

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ON what does the recovery from acute disease depend? It is difficult to answer this question without distinguishing between different kinds of disease. Thus, if the disorder be one that runs a definite course, and tends to pass away, like most of the acute infectious fevers, recovery may be said to depend upon keeping the patient alive during the period of the disease. Some acute diseases, on the other hand, progress indefinitely, and destroy the tissues of the body. Acute generalised tuberculosis is a disease of this kind. Perhaps, under some conceivable circumstances, even this disease might show a definite course and tend to recovery, but the conditions of the human body, as we are acquainted with it, do not admit of this.

From the clinical standpoint, we might call those diseases which naturally tend to recovery, benign, and those which progress indefinitely, malignant. In seeking to learn on what recovery depends in a given case, we must first ask whether the disorder can be allotted to one of these classes, or, in other words, what is its natural termination. In many instances, this is easily decided, as in the infective diseases already alluded to. I would be disposed to put all catarrhal diseases in the benign class, and all inflammations of organs due to a sporadic cause, such as accident or chill; but if the inflammation is due to a constant cause, such as pre-existing tubercle, or cancer, or a poison circulating in the blood, it will generally belong to the opposite class. There will, however, be many diseases which cannot certainly be allotted to either class, but which sometimes belong to one and sometimes to the other, according to the reaction of the individual subject.

Benign acute disease.—Let us take first cases of benign acute disease, in which the natural tendency is towards recovery, and in which our efforts are directed to keep the patient alive until the disease has subsided. Life depends more obviously upon the maintenance of the heart's action than upon that of any other organ, and it is sometimes said that a man lives as long as his left ventricle. At the finish, when the crisis of the struggle for life comes in a severe and dangerous case, the heart's action is certainly the chief criterion of his condition and chances. But surely we must go behind the heart, and far less must we be satisfied with the phrase, "failure of heart's action," now so often used by the public in relation to the cause of death. For on what does the heart function depend? Upon the integrity of heart muscle, and of nerve centres. And these depend upon nutrition. So that we get down to the nutritive condition, to the

state of blood and tissues, as the really dominant factor in the maintenance of life. I am leaving aside questions of mechanical interference with the circulation which complicate the problem in many cases. I am supposing that we are face to face with a severe case of typhoid fever in the fourth week, or of acute pneumonia about the seventh or eighth day; there is a high temperature, a rapid pulse of low tension, a dry tongue inclining to a brown hue, some delirium and insomnia. But there are, we will suppose, no symptoms threatening life, in lung, or bowel, or elsewhere, besides the asthenia, and our query is, will this patient live through the attack? If he survives another two or three days, in all probability he will recover. The survival apparently depends on the strength of the heart. Essentially, as I have shown, it depends upon nutrition. And nutrition brings us to digestion and assimilation, by which alone the body can be nourished. So that it may be truer to say in some of these fever cases, that "a man lives as long as his stomach"; and digestive power is found to be a principal factor in the recovery from acute disease. It is singular that this lesson should be learned so late in the world's history as has been the case; that it should be reserved for Graves to write as his own epitaph, "He fed fevers," and for Gairdner to follow with the pregnant motto, "*Lacte non vino.*"

Malignant acute disease.—Let us now consider cases of acute disease which do badly from the outset, and progress steadily until life is destroyed. As simple examples of this class, we may take acute tuberculosis, and the acute form of ulcerative endocarditis. In the present state of our knowledge, neither of these diseases, when present in a well-developed form, admits of recovery. Such recovery is so exceptional, that it raises a suspicion as to the diagnosis. These diseases are malignant by their very nature.

But there are other disorders which, although benign in some subjects, are malignant in others. Examples of these are erysipelas in the old and feeble, and acute catarrhal pneumonia in debilitated persons. That this is so will not surprise us, since the entity which we call a disease is actually a resultant of several causes. There may be a *materies morbi*, a germ, toxine, or poison, introduced from without, but the phenomena of the disease, which in ordinary thought and parlance comprise the disease itself, are due of course to the reaction of the human body to the morbid cause. Such reaction varies greatly, and if it is bad, a benign disease may become malignant.

Let us take the latter class of disorders first, those in which the malignancy is due to fault on the part of the subject.

A disease is acquired, whether by infection, as in scarlatina, or whether it be an inflammatory disease, such as nephritis or meningitis, which, in the present state of our knowledge, we ascribe to a chill, or to nothing at all, and use the term idiopathic as a cloak for our ignorance. The reaction of the system to the disease

is bad from the beginning; there is not the rapid favourable pyrexia, temperature running up to 103° or 104° , without great disturbance of the bodily sensations, which we learn to look upon with satisfaction. But there is, on the other hand, a low febrile state, with prostration of the bodily powers and a dulled sensorium. The patient is smitten, and instead of an elastic rebound, the stroke falls dead upon his weak organs and loaded tissues. The disease is not one that is necessarily or generally fatal, but the subject is at fault. Can we foresee this from the beginning? Probably not, but there should be signs from an early stage in the disorder. When the enforcement of physiological rest,—a warm bed, good nursing, and regular liquid food, together with easy action of the emunctories,—skin, bowels, and kidneys,—when these bring in the course of two or three days no remission of symptoms, no revival of vital power, but, on the contrary, the pulse remains quick, the temperature remittent, and the manner either dull and depressed, or excited and sleepless,—then there is reason to fear an ill result, even from a disease which usually runs a favourable course.

The diagnosis between benign and malignant forms of the same disease is then of great importance. The malignancy may depend in some cases upon the varying virulence of an infective disorder in different outbreaks, such a disease as scarlatina or even measles appearing sometimes in a severe form, and proving fatal to the healthy. But more commonly in the case of an ordinarily benign disorder, the malignancy is due to bad reaction on the part of the subject.

But there are other cases in which the disorder itself shows a malignancy against which an apparently healthy body strives in vain. I have alluded to acute tuberculosis and other infective processes which end in death. Did space permit, I should like to describe three cases in which acute diseases, hard to define, occurred to persons who seemed to be in good health, and destroyed life within a few days or weeks. In two of these the subjects were men of about 60 years of age,—one was a patient of Mr. Robert Odell of Hertford,—and such symptoms as existed, other than those of pyrexia, pointed to inflammation of fibrous tissues in the back and thigh. In another, a woman rather younger, there was some generalised dermatitis going on to sclerodermia. Pneumonia or pleuritis supervened in all cases near the close, but it would be to my mind unscientific to call these cases of pneumonia. There was a morbid influence at work, and of a malignant character, and neuritis, dermatitis, or pleurisy were surely local manifestations only. I suspect such cases to be akin to infective endocarditis, although there were no special heart symptoms, and that there was a specific organism or its toxine in the blood.

Let me repeat the chief features. An apparently healthy

person is affected with progressive pyrexia of a malignant character, evoking a bad reaction from the outset, and early depressing the vital centres. Some local lesion on the skin or lung surface, or in the nerve sheaths, or fibrous tissues, appears after a time, but the case steadily proceeds to a fatal end, in the production of which the local lesion appears to take no appreciable part.

In the prognosis of these difficult cases some rules which Sir Andrew Clark used to lay down are very useful. I give only the substance of them. What is the significance of the phenomena that are present in this case? Does your hypothesis when formed account for all the symptoms? In such cases the hypothesis most readily formed as to the nature of the disease does not account for the severity of its effects, and we are led to think of some infection or malignant cause behind, which will make our prognosis unfavourable.

A true diagnosis is, then, the first condition of prognosis. We must answer the question, Have we here a well recognised disease? Does it naturally tend to recovery or to death? (is it benign or malignant?) Sometimes these queries are capable of a plain answer. The case is a typical one. At other times this is not so, and we must use caution in prognosis.

I will now take up the clinical history of a case of acute disease with a view to prognostic signs.

Inheritance.—What we know as “inheritance” consists in large part of inherited habits, “common habits” of body and mind, common ways of reacting to external influences; and these have much bearing on prognosis. Does the patient come of a good stock? In some families there is a tendency to early death, or to suffer, and suffer fatally, from some of the acute specific fevers, notably the group consisting of typhoid, scarlatina, and diphtheria, with which acute rheumatism and its congeners, including a form of epilepsy, are allied. Some families show a poor vitality. When an epidemic disease attacks the children, they die off rapidly almost *en bloc*. Such a sad event happened to a late Archbishop of Canterbury, five children dying at one time of scarlatina. I have known a closely similar instance, and am reminded of two pretty large families in which all the children died of phthisis, one after another, in youth and early adult life, leaving the parents alone. In other stocks the physique may be far from robust, and yet the members are tough and “pull through” illnesses successfully.

Past history.—The history of the patient has an obvious bearing. I need scarcely allude to the evil effects of past alcoholism, in hindering recovery from every kind of acute disorder, especially of alcoholism of a chronic sort, when little food has been taken for a long period. Such cases have, one may say, no resisting power. I remember a woman who took erysipelas and miscarried in the fifth month, and died in a few hours of sheer collapse before the

placenta could be removed; she had been living on nips of brandy for weeks and months, taking hardly any food. The rapid decline in phthisis when it attacks alcoholic subjects is well known. A history of insomnia, or of privation, or other ill conditions of life, also lowers the resistance to acute disorder. Yet in some cases, contrary as it may seem to this doctrine, a history of weakening conditions prior to an acute attack leads to a favourable prognosis. Dr. H. G. Sutton points out that when a person has had his blood tension lowered for the time in this way, and an acute disorder has supervened, the augury is better than if the symptoms were due to the latter alone. Rest will bring better nutrition and increased tension, and the acute disease will pass off.

Present condition.—General physique and habits.—No healthy adult, Sir Andrew Clark used to say, under the age of 40 years, ought to die of acute specific disease. This is a rule of prognosis, and I trust that it finds its fulfilment in the experience of all of us. Acute disease in the robust tends to be sthenic, the febrile reaction is great, and when it kills, life is destroyed by the intensity of the process. In the less vigorous, the fever takes generally a lower range, and death by general asthenia is to be feared. It is in favour of the less robust that such patients commonly give in to illness sooner than others, and take rest. This fact has, I suspect, a large influence in determining the mortality of typhoid fever. The state of nutrition has of course only a limited relation to bulk. Many stout persons are bad subjects for acute disease. Out of ten men who died from enteric fever and influenza within ten years of taking out policies of life assurance in one office, I found that six were men of heavy build.

As regards habits, the effects of alcohol have just been alluded to, but it may be added here that if the disease itself is caused by alcohol, or by any other constant cause which is removable, for example lead, the prognosis is generally favourable. Thus acute alcoholic gastritis, alcoholic dementia, and delirium tremens show a remarkable power of recovery. Remove the cause, deliver the tissues from the continual soakage with a poison, and in a few weeks nature reasserts herself, and healthy action returns. I have seen this in a striking manner in old alcoholic subjects. When they become so desperately ill that the taste for alcohol is lost, as it is lost in dementia, then, though death by coma may seem to be imminent, they begin to recover.

Nervous system.—Temperament.—I come next to conditions which relate to the nervous system. We all know the benefit of an easy mind and temperament to an acute sufferer, and the adverse effect of care and worry. It may be our part to bring him this boon, or at all events help him to obtain it—quietness of mind as well as body. Fear tends to death. How great are the anxiety and alarm which attend some cases of heart disease, and how much it adds to their peril? "Cough it up," said Dr. H. G.

Sutton to a man with profuse hæmoptysis, and terrified at his own symptoms, "Cough it up, Captain. It will do you good."

Let it be ours to bring the blessed influence of hope. "The hope of cure," said Voltaire, "is already half the cure." It was the opinion of Brodie, that "a sanguine mind, tempered by a good judgment, is the best for a medical practitioner."

It is better to err on the side of hopefulness, if err we must. In my opinion an entirely hopeless prognosis should scarcely ever be given. "I give him six hours, more or less," says the London doctor in Ian Maclaren's story, but the shrewd wit of the countryman, nerved by sore need to desperate effort, brought the patient through. How often we hear, "he was given up by two doctors," and yet recovered. There may be truly but a slender basis of fact for such a statement, but it is better wisdom not to shut out from any case, however extreme, the last glimmering ray of hope, the very complement of life itself.

How potent again is will power, to aid recovery? A presentiment of death tends to fulfil its own prophecy, although I have known at least one case where a rooted conviction of this kind did not prevent the patient from getting well. The power of will was remarkably shown in a man of advanced years known to me, who engaged, even into his ninetieth year, in travel for religious and philanthropic objects over various parts of the world, enduring hardships in Africa, China, and elsewhere. He was repeatedly struck down with acute illness, vesical, alvine, spinal, etc., and lay on his back for weeks and even months at a time, but his spirit was never broken; he always held to a firm conviction, contrary sometimes to that of others, that he should recover and go on his way. And he did recover, and returned to die quietly in his house at ninety-two.

The power of sleep is a very important factor in estimating the outlook of acute disease. "Lord, if he is fallen asleep he will recover," said the disciples concerning the illness of Lazarus; a truth early established by the ancient physicians, whose clinical insight was in some ways probably equal to our own. Little hope is there for the sleepless fever patient; we can, however, do much more to promote sleep than was possible to our forefathers. The existence of hysteria is of favourable omen in prognosis, for it generally exaggerates the symptoms of whatever disease is present, and so the patient seems to be more ill than is really the case. A like effect is produced in women by the presence of the menstrual epoch, which certainly accentuates febrile conditions. Nervous women are not, one would suppose, favourable subjects for diseases, and yet they have oftentimes a way of getting through acute and threatening disorders, even to the surprise of their physicians.

"I really think she will worry through,
She scolds me just as she used to do!"

says the husband in the American ballad. Symptoms of pyrexia and a rapid pulse are of more significance in men than in women and children, because the nervous centres of the latter are more easily disturbed.

Of acute mental disorders, I would hazard the statement that in the young they are generally recoverable, but in the aged almost invariably fatal. I have not known of a case of recovery from acute dementia in the aged, especially that form which comes on after surgical operations.

Circulatory organs.—Much might be said upon prognosis derived from the state of the blood and the organs of circulation. Accurate examination of the blood, giving data for diagnosis and prognosis, is destined, I do not doubt, in the future, to take a larger place than at present in ordinary clinical work. In acute diseases, pallor from blood destruction, and a livid venous hue from ill aeration, are the most obvious blood conditions that we watch for. In infants, the livid hue is most plainly seen in the skin of the face round the mouth, and thence extending upwards to include the nose. When this tint is well marked, convulsions are not far off.

The heart is a wonderfully elastic organ, and subject to great variation of rate in acute disorders. A sudden drop from 120 to 60 beats per minute, such as we often see at the beginning of convalescence, does not appear to incommode the patient. A heart-rate progressively increasing from day to day, though it be by only 2 or 3 beats per minute daily, is one of the most certain and sinister signs in prognosis, and sometimes gives warning of a fatal end for weeks beforehand. A pulse much over 100 in old persons is a bad prognostic, provided we can exclude alcohol, and a neurotic temperament. On the other hand, a very slow pulse in acute disease is risky, and dictates absolute rest, warmth, and stimulants. In some cases of failing circulation, chilling begins at the extremities a number of hours before death. A valuable test of the reserve heart power is to try cautiously the effect of change of posture upon the heart's action. The fatal end is, we know, often proximately caused by sudden effort on the part of the patient, such as sitting up in bed, and we obtain useful information by carefully testing the ability of the organ to bear extra strain.

Respiratory organs.—We may usefully ask in a case of acute disorder, how much margin of respiratory power exists? Dyspnœa is the sign of an empty treasury; the working balance is spent. And so our best clinicians watch the breathing, and help it in every way they can. Rapid respirations, unless due to lung lesions or nerve influence, are of ill omen; so is shallow breathing.

Some years ago, Dr. Stephen Mackenzie put the question at a meeting of the Clinical Society of London, whether recovery ever took place in a case in which Cheyne-Stokes breathing had developed. A number of instances were brought forward in

response, amongst others, one that I had observed with the late Mr. Rean of Brighton, in which this form of respiration had been recovered from. It is, however, a sign of very low nervous tension, and generally forebodes a fatal end.

Digestive organs.—I have already spoken of the leading part taken by assimilation and nutrition in determining recovery. We ask then, How is this patient eating? Is there appetite, vomiting, diarrhœa? Is the tongue moist? Is he assimilating food, not merely swallowing it? Inspection of the stools passed will often tell us this. Is he wasting too rapidly? Much progressive wasting goes on in many acute diseases. We see the wasting, and know that it will go on, whatever we do, but can we so far check it as to keep the patient alive until the morbid process ends? A patient may die with a clean tongue; I remember such a case in an infant whose illness was long and chronic; moreover, some tongues, owing to atrophy of the papillæ, do not readily put on fur. But the power to take food and to digest it is a strong point in favour of betterment. In alcoholism, both acute and chronic, it is the chief factor in prognosis. Singular, if I may digress for a moment, is the contrariety we meet with in medical practice. Many will recollect Sir A. Clark's story of the eminent divine, whose organs were loaded to breaking point, and he was "kept up" by constant foods and stimulants, and how Sir Andrew declared that his diet must be reduced; the friends refused the advice, Sir Andrew departed, and only returned on a second summons, when he was given *carte blanche*. The patient recovered and lived for some years after. Let me set beside this, a case of Dr. Kidd's, acute gastritis in an aged person. He had the courage, if I am not mistaken, to feed her on sugar and warm water, and she got quite well; in a second attack she fell into other hands, was highly fed, and died. Let us follow good old Chancer's "Doctor of Phisyk."

"Of his diete mesurable was he,
For it was of no superfluitee,
But of greet norissing and digestible."

Skin and kidneys.—Since acute disease puts an extra strain upon the emunctory organs, the prospects of a favourable issue depend in no small degree upon the efficiency of these, and particularly of the skin, kidneys, and bowels. The instinct of the old physicians in clearing the *primæ viæ* at the outset of acute disorders was a sound one. It may have been overdone, but the blue pill, saline purge, and even the emetic, played in some cases a very helpful part. I fear that our gentler methods sometimes fail. I have a case in my mind; that of a stout man of 36, one who lived under much mental strain, and broke down suddenly with fever that ran a rapid course, was attended with pneumonia, jaundice, and failing heart, and soon destroyed life. In such a case as this, an early purge, and sedulous attention to skin and kidneys,

would seem to give the only chance of recovery. This is, however, a digression. In prognosis, we come back to the question as to the margin of power of these organs. Acute disease calls out the reserves, and it is ill with him who cannot answer to the summons. A kidney that is passing albumin is already unequal to the work required of it. When the total solids are much reduced, the same thing is still more evident. A dry skin is a distinctly unfavourable condition for disease, both acute and chronic. I examined a man of 31 years for life assurance, who had an unusually dry skin, but a good family history and little else inconsistent with health. He died in five years of phthisis. It is, however, remarkable how well acute inflammation of the kidney is often borne. I saw a man in severe typhoid fever with Mr. Collyer of Enfield; there was concurrent nephritis of an acute character, and a history of former attacks. Yet he recovered well. In these cases, the skin and bowels, if kept fully in action, can do much in substitution for the kidney function.

Conclusion.—Let me end these few notes by two or three general remarks. Old practitioners, from long dealing with the sick, get an intuitive sense of prognosis, for which it might be hard to render adequate reasons. At a consultation, the scientific men were discussing with animation the pathological problems of the case, but the local attendant, an old Yorkshireman, quietly observed, "You may say what you like, he's ba'n to croak." And die he did.

A young practitioner is apt to err by thinking too much of the physical signs, and too little of the patient. I remember treating, when I was young in the art, a big active city man, who had a patch of crepitations at the base of one lung. I wanted to keep him in bed, but he grew restive, and fled to the seaside, escaping from both bed and doctor at a stroke—and with impunity.

The first art we acquire is to treat the disease. To treat the patient is a talent which comes later. But the personality of the sufferer, his idiosyncrasy, his equation, enter largely into prognosis. It is by degrees that we learn the value of rest,—not "doing nothing" but "not hindering anything,"—and that we discern the patient's chances of life to depend largely upon the completeness with which this rest is fulfilled. It is by degrees that we learn to "trust the human body." Let me quote once more the philosopher who once adorned British medicine, Dr. Sutton: "Doctors who look too much on morbid anatomy, the dead side of disease, are apt to give too gloomy prognosis. They cannot trust the human body."

SOME RECENT RESEARCHES ON ALCOHOL; THEIR BEARING ON TREATMENT.¹

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DURING the latter half of the nineteenth century the movement in favour of temperance in the use of alcoholic drinks has been steadily growing in extent and power. This tendency is quite as evident amongst the members of the medical profession as it is outside of it, and it is by no means confined to the English-speaking nations. The medical papers of Germany, France, and all the other nations of the Continent, have been much taken up of recent years with the alcohol question. It is not to be wondered at that a subject so many-sided, and with such vital relations to the welfare of nations, is frequently discussed, even in scientific societies, with an absence of that Olympian calm which is characteristic of the man of science. In the following paper, I wish to adhere as closely as possible to the scientific side of the question, to give a *résumé* of some recent work on the action of alcohol, and to estimate the effect of this work on our use of alcohol in certain classes of disease. While many experiments and observations seem at direct variance with one another, some important points are apparently fairly well settled; on these I wish to lay stress.

I. Let us consider alcohol as a stimulant, an agent for increasing the functional activity of certain organs or systems. Schmiedeberg² of Strassburg holds strongly that alcohol acts on the nervous system as a paralysing agent, and not in any true sense as a stimulant. He places it in the class of nerve and muscle poisons of the fatty series, in the special group containing such hypnotics as paraldehyde, chloral hydrate, sulphonal; and anæsthetics, such as chloroform or ether. They have, in common, a marked effect in lowering the functional activity of the central nervous system, brain, cord, and medulla. Reflex excitability is also lowered or done away with, this being an essential distinction from the morphine group. While we speak, in a general way, of the strengthening, stimulating, and animating effect of alcohol, Schmiedeberg and others show it is very difficult to prove this on any definite organ of the body. In the mental sphere, the finer degrees of attention, judgment, and reflection are lost first. Hence Dutch courage and the self-confidence of the after-dinner speaker. Great numbers of experiments as to reaction-time have been made by Kraepelin and others, with the result that mental processes are shown to be slowed by even moderate doses of

¹ Based on a paper read before the Forfarshire Medical Association, Dec. 13, 1900.

² "Arzneimittellehre," Leipzig, 1895.

alcohol, while the person experimented on believes he has been working much more quickly. Thus Ach,¹ working under the direction of Kraepelin, has studied "the influence of alcohol upon perception, the person under experiment being required to read through a small slit a continuous series of meaningless syllables and monosyllabic and dissyllabic words, which were written on a revolving drum. The administration of 30 c.c. (about 1 oz.) of alcohol greatly reduced the perception." In the paper from which I have taken this, an account is given of some much more elaborate mental experiments, all pointing in the same direction. No doubt, within certain limits, the brain may become used to the presence of alcohol, so that such derangement of function is less apparent, and individuals vary very greatly in their susceptibility. But many men, accustomed to the moderate use of alcohol at night, find that even a glass of beer in the middle of the day unfits them for doing their best mental work. Welsh² has called attention to the recent work done on vascular arrangements in the substance of the nerve cell. He says: "It is apparent that, to meet the extraordinary demands of the most highly functioning of the animal cells, an elaborate arrangement of lymph canaliculi and blood vessels is provided. As nutriment is by this means diffused through the cell protoplasm, so also are deleterious and noxious substances."

It is probably through the nervous system that the paralysing effect of small dietetic doses of alcohol is exerted on *muscle*. Laboratory experiments in proof of this are tolerably easy to carry out, and the conclusions of different observers (Deladrier, Kraepelin, Frey, Destrée), though differing in details, are, on the whole, much alike. The dynamometer is sometimes used, but more satisfactory is Mosso's ergograph. In this apparatus "a special arrangement prevents the action of any other muscle than those which bend the middle finger of the hand. By means of a small cord passed around a pulley the finger raises vertically a weight; to the cord is attached a needle, which records on a dial the height to which the weight has been raised." A weight of, say, 4 or 5 kilos is raised perhaps every two seconds for a given time. After taking alcohol, even in doses of one-sixth to two-thirds of an ounce (90 per cent.), there is a favourable effect for about fifteen minutes; the paralysing effect then sets in, so that the total work-product obtained with the use of alcohol is less than that obtained without it. One example may be given from Destrée's paper³: without alcohol, the product is 22·330

¹ Kraepelin, *Wien. klin. Wchnschr.*, Oct. 17, 1900 (Abst. in *Med. Temp. Journ.*, London, May 1890, p. 107).

² "Lymph Canaliculi in the Nerve-Cell Protoplasm," etc., *Scot. Med. and Surg. Journ.*, Edin., Nov. 1900, p. 460.

³ "Influence de l'alcool sur le travail musculaire," *Journ. de méd.-chir. et pharmacol.*, Bruxelles, 1897, Nos. 44 and 47 (*Med. Temp. Journ.*, London, 1899, Nos. 3 and 4).

kgrm.-metres; with alcohol, 15.935. Loss, 6.395 kgrm.-metres. The same result, in a much more impressive form, was recorded by Parkes, from his observations on the marching of soldiers in the Ashanti War.

The stimulating *action of alcohol on the heart* is popularly supposed to require no proof. But exact observation will not admit such action. Schmiedeberg denies that there is even quickening of the pulse, apart from the stimulating circumstances in which alcoholic drinks are usually taken. Measurements with the sphygmo-chronograph by von der Mühl and Jaquet on eight young, healthy, or convalescent men showed that amounts of 50 to 100 c.c., diluted to a 20 per cent. mixture, had practically no effect on the heart or circulation. H. C. Wood, experimenting on animals whose heart was failing from advanced chloroform anæsthesia, found that in no case did alcohol, whether in small or large dose, produce any increase in size of pulse or arterial pressure; on several occasions the larger amounts of alcohol appeared to greatly increase the rapidity of the fall of arterial pressure. As to the influence of alcohol in cardiac weakness, Schmiedeberg says it might be advantageous in removing a vascular spasm, and thus making the circulation easier, or a too marked tonus in the cardiac inhibitory nerves might be lowered, or a condition of irritability in the cardiac motor ganglia might be soothed. But a direct stimulation of the heart muscle by alcohol is not yet demonstrated by experiment.

Binz¹ claims that alcohol is a stimulant to the *respiratory* centre. In two papers, published in 1899, he gives an account of experiments by himself and his assistants, which showed that the volume of air passing through the lungs when alcohol had been taken was increased through a greater depth of respiration, or in some cases, where the breathing was shallower, through a quicker rate. This effect was often seen, even when sleep had been produced through the wine. A wine of rich bouquet had a more marked effect than alcohol combined with water, sugar, and lemon-juice. The experiments did not show any regular relation between the amount of alcohol taken and the effect on respiration. In some cases there was a fall instead of a rise of the respiratory curve. Binz does not say how the stimulus is exerted on the centre, but he indicates that further investigations are needed to show whether or not there is some paralysis of physiological inhibition. The amount of oxygen absorbed and of carbonic acid exhaled in those experiments is not stated, but others (by Zuntz, Geppert, etc.) seem to indicate that there is no constant difference in the amounts of these gases when alcohol is taken. Hæmoglobin forms a close union with alcohol, and blood with alcohol

¹ "Neuere Versuche ueber Weingeistwirkung," *Therap. d. Gegenw.*, Berlin u. Wien, 1899, No. 1; "Weitere Versuche ueber Weingeistwirkung," *ibid.*, 1899, No. 11.

in it does not part with its oxygen readily. Perhaps this may account for the necessity for increased respiratory effort, a necessity which is noted by Binz to be much greater in tired than rested individuals. The lowering of body temperature by alcohol has also been suggested as an explanation. It is clear that various points have to be settled before we can accept the stimulation of the exquisitely sensitive respiratory centre by alcohol as more than compensatory for other effects, possibly deleterious.

II. As to the *effect of alcohol on the tissues* of the body, there is a striking want of harmony even amongst scientific observers on many points. Whether alcohol is a food or a poison is still a matter of hot debate, as it was twenty or thirty years ago. It is generally admitted that alcohol in quantities up to 2 or $2\frac{1}{2}$ oz. is, for the most part, oxidised in the body of a strong, well-developed man in the twenty-four hours; at all events, only from 2 to 5 per cent. of the amount taken can be recovered from the excretions. Oxidation of alcohol into carbonic acid and water implies the transformation of so much potential into so much kinetic energy, which may be employed to produce heat, or internal work, or external voluntary work. Atwater's¹ experiments, the most elaborate hitherto devised, appear to demonstrate this view afresh. The general opinion is that alcohol in moderate doses thus saves the body fat, and that it does not save the proteids, in some cases even causes an increase of proteid metabolism. This question is very far from being finally settled; results vary evidently with unknown conditions. The important point seems to be to find out what the alcohol is about in the body before its final oxidation, or during this process. This change must occur, like all metabolic changes, in the protoplasm of the various cells, in the tissues, not in the blood. Physiology throws little light on the point; "the whole story of proteid metabolism consists at present mostly of guesses and of gaps" (Foster). Schäfer says: "It cannot be doubted that any small production of energy resulting from the oxidation of alcohol is more than counterbalanced by its deleterious influences as a drug upon the tissue elements, and especially upon those of the nervous system."² Morbid anatomy provides us with a superabundance of evidence of these deleterious influences in chronic alcoholism, and between this condition and the merely functional impairment produced by single moderate doses of alcohol, there must be every conceivable gradation. Functional derangement implies a molecular abnormality in the protoplasm, which cannot be demonstrated to the eye, and which can be repaired if the necessary conditions are present; in the absence of these conditions, it may easily pass into organic alteration. The distinction is convenient, but not, strictly speaking, scientific.

¹ *Bull. U.S. Agric. Bureau*, No. 69; popular article, *Harper's Monthly Mag.*, Oct. 1900.

² "Text-book of Physiology," vol. i. p. 882.

The poisoning of the tissues is shown in another way, by the *impaired resistance to infectious attack*. We are constantly seeing evidence of this in practice. Pneumonia and phthisis, for example, have been indubitably proved to occur more frequently, and to be of more serious significance, in drinkers than in persons whose blood is practically free from alcohol. Surgeons provide similar testimony in regard to the capacity for healing quickly and soundly. Various recent sets of experiments on animals confirm clinical experience. The most complete and most important are those of Laitinen,¹ of the University of Helsingfors. Professor C. Fränkel² of Halle, according to whose suggestion and scheme the experiments were carried out, gives a brief account of them, with examples and comments, but I may be allowed to quote the abstract given in a recent number of the *British Medical Journal*. There were used "no fewer than 342 animals—dogs, rabbits, guinea-pigs, fowls, and pigeons. As infecting agents, cultivations of the anthrax, tubercle, and diphtheria bacilli were employed. These were chosen as types of acute infection, chronic infection, and a pure intoxication. The alcohol employed was, as a rule, a 25 per cent. solution of ethylic alcohol in water. In greater strength, the alimentary mucous membrane of birds became inflamed. Some of the dogs had 50 per cent. solutions. It was given either by œsophageal catheter or by dropping it into the mouth from a pipette. The dose varied with the animal, and with its weight, from $1\frac{1}{2}$ c.c. in the case of the pigeon to 60 c.c. in that of some of the dogs. It was administered in several ways and for varying times; sometimes in single large doses, at others in gradually increasing doses for months at a time, in order to produce here an acute and there a chronic poisoning. . . . Dr. Laitinen found that in all these cases, without exception, the effect of the administration of alcohol in any form whatever was to render the animal distinctly, sometimes markedly, more susceptible to infection than were the controls."

One remarkable fact which came out clearly in those experiments was the varying susceptibility in regard to the intoxicating effect of alcohol among animals of the same species, size, weight, age, sex, and condition of nourishment; nevertheless the diminution in natural resisting power to the infection seems to have been independent of this variability. Fränkel holds that even when necessary allowances for differences are made, one is bound to draw the conclusion that the employment of alcohol in the treatment of infectious diseases in man is not by any means to be lightly resorted to. And although the doses are large, they can be

¹ *Ztschr. f. Hyg. u. Infektionskrankh.*, Leipzig, July 19, 1900; *Act. Soc. scient. fennicæ*, Bd. xxix. No. 7 (Abst. *Brit. Med. Journ.*, London, Sept. 22, 1900).

² "Die Verwendung des Alkohols in der Behandlung der Infektionskrankh.," *Therap. d. Gegenw.*, Berlin u. Wien 1900, No. 1.

paralleled in medical practice, one instance being quoted where the patient, suffering from anthrax of the nose, got daily two whole bottles of red wine, champagne, and cognac, and was thus saved. This, he says, is surely using Beelzebub to cast out Satan. Whether alcohol lowers the power of resistance through interfering with leucocytosis, as Woodhead maintains, or diminishing the alkalinity of the blood, or in some other way, is not yet settled.

From the foregoing, these conclusions seem justified. The stimulant effect of alcohol on brain, heart, or muscle, if existing at all, is very brief, lasting probably only a few minutes. Its apparent effect in stimulating respiration needs further investigation as to its mode of causation. On the tissues, alcohol acts as a protoplasmic poison, and this must be borne in mind if we use alcohol for its nutritive value.

Clinical observation has been, on the whole, moving along parallel lines with the researches in the laboratory, the marked tendency in recent years being to restrict the administration of alcohol as a medicine. The influence of authority and tradition, even when supported by "clinical experience," must inevitably be diminished through counter-results obtained by purely scientific methods. However stoutly clinical observers may appeal to the results of treatment, we are all too painfully conscious that the history of medicine consists largely of the substitution of one set of erroneous deductions for another, and we gladly welcome the aid of the pharmacologist who is giving us a basis for more reliable observations.

As regards the whole class of diseases of the *nervous system*, there are few, I suppose, who would expect any benefit from alcohol except of a sedative or narcotic character.

Alcohol will give a temporary relief in worried states, in hypochondriasis, in neurasthenia, in neuralgia of women, in dysmenorrhœa, but the cautious physician must hesitate long before taking the responsibility of prescribing it. In insomnia, the narcotic effect of alcohol is sometimes very marked, both in young children and adults, and it may be given disguised with a bitter or bromide. As Yeo says, "if we could be sure that there was no danger of producing the habit of alcoholic indulgence, we might find in it one of the least objectionable of narcotics. But except in large quantities it has little influence over obstinate cases."¹ The great mixed mass of mental diseases, as found in asylums, are best treated without alcohol, whatever the cause or nature of the case. Men like Forel of Zürich have entirely banished alcohol from the asylums they control. Forel² says the distinction between use and abuse of alcohol, difficult as it frequently is with ordinary men, is quite obliterated with the mentally unsound. Every use

¹ "Manual of Medical Treatment."

² "Die Rolle des Alkohols in Psychopathologie," *Deutsche med. Wchnschr.*, Leipzig, 1894, No. 52.

is misuse. Alcohol, he thinks, while directly responsible for a large proportion of insane, injures many more through its effect on the germ plasm. According to him, syrups, juices of fruits, lemonade, tea, and, above all, good water, should be substituted in all asylums and institutions for the treatment of nervous disorders.

I have not much to say about *alimentary* diseases. In some cases of simple dyspepsia a little alcohol with a meal, well diluted, is found to give relief, often no doubt through its sedative action on the nerves, or it may be through increasing the secretion of gastric juice, and thus aiding digestion. There are excellent substitutes for it, and I do not wish to improve on my own practice of treating the case without this aid. I am perfectly satisfied with my results. Other gastric conditions, catarrhs, ulcers, and so forth, also all intestinal disorders, are, I think, better treated without alcohol. Still, it is likely the relief given in colic and some cases of diarrhœa by the home use of brandy will favour its continuance. I need not say that liver disorders are probably in all cases prejudicially influenced by alcoholic beverages.

In *kidney diseases* of all kinds alcohol should be rigidly withheld. We ought to protest against the popular use of gin as a diuretic. Glaser,¹ working under von Jaksch, made 106 observations on fifteen individuals, and found that alcoholic drinks in relatively moderate quantities showed their irritating effect on the kidneys by the presence of leucocytes and casts, and uncommonly large numbers of crystals of oxalate of lime and uric acid, these latter being no doubt due to the prejudicial influence of the drug on metabolism. The effect of a single excess was not discernible after thirty-six hours, but continued use of drink was cumulative.

In no class of diseases is alcohol more generally considered indispensable than in septic cases, puerperal, perhaps, above all. A. Martin² of Berlin, the distinguished gynæcologist, is (or was, eleven years ago), a strong advocate of this treatment, pushing the drink till diarrhœa sets in. One of his patients in the course of six weeks got seventeen bottles of cognac, thirteen of Burgundy, thirty-seven half-bottles of champagne, four and a half of other strong wines, and six of porter, and she recovered. The virtue of alcohol consists, he holds, in its strengthening the action of the heart, and raising the resisting power of the individual to the attacks of the infection. The best comment I can make on this is to ask for proof in face of the experiments alluded to earlier in this paper. It must be borne in mind that all the other resources of modern medicine, including as concentrated and nutritious a dietary as possible, were employed.

¹ "*Deutsche med. Wchnschr.*, Leipzig, 1891, S. 1193.

² "*Ueber die Alkoholtherapie des Puerperalfiebers*," *Deutsche med. Wchnschr.*, Leipzig, 1889, S. 619.

Pneumonia may be taken as the most convenient example of *acute infectious disorders*. We all see many cases of acute croupous pneumonia, and its treatment has for long reflected the prevailing views of the physicians of the time. Many living men recall the huge doses of 12, 18, and even 36 oz. of brandy in the twenty-four hours, which were considered necessary in many cases, and it is quite possible that the results, as shown by statistics, might not look very bad. Statistics are really of small value in helping us to a conclusion. The mortality, in different localities, differs quite independently of treatment, from the class of patient, habits of living, vitality, and so forth. Even from the same records it is probable that no two men would deduce the same inferences. Moreover, as Aufrecht puts it, "in one and the same town, in one and the same hospital or medical district, among people who on the whole have experienced no change whatever in their social environment throughout a series of years, with a treatment of pneumonia by one and the same physician with exactly the same methods, the mortality within this series of years may be astonishingly varied." Nevertheless we must look to clinical records for a control test of the value of scientific laboratory work.

Alcohol is recommended in croupous pneumonia as a food or as a stimulant. Lauder Brunton, who is extremely restricted in his advocacy of alcohol says, in his "*Materia Medica*," it "seems useful in acute disease running a limited course, where we wish to sustain the patient's strength until the crisis is past, as well as to prevent it sinking from debility afterwards." Further, he says, useful indications may be obtained by the practitioner "remaining beside the patient, counting the pulse, and watching the tongue, respiration, skin, and general condition for a quarter of an hour after the dose has been given." Now, I submit that the evidence thus got is not sufficient to demonstrate improvement; on the contrary, it is likely to mislead, for the brief stimulating effect of alcohol, such as it is, is to be measured by about fifteen minutes, after which comes a prolonged period of depression. From this it is very difficult to make a favourable change by repeating the alcohol. The weighing of the depression produced by the first dose against the stimulation produced by the second would be a nearly impossible task, which would become greater and greater as doses succeeded one another. There are, so far as I know, no exact and complete observations on the oxidation of alcohol in a feverish state of body. It is generally believed that much more can then be borne without damage to the nervous system. Certainly the ordinary signs of alcoholic intoxication do not appear so soon; whether that is not in large measure due to the position of the patient, the already existing numbing of his senses, and the delirium which may be already present, I cannot say. It is certain that even a case of acute pneumonia may be made very obviously drunk, and a most dangerous poisoning every one would admit this to be. It is

by no means improbable that many lives have been lost through the tendency to pour in the stimulant when things seemed to be going from bad to worse.

As to the food value of alcohol in pneumonia, I think this need hardly be taken into account. At the best it is in all probability very small; pneumonics usually take true foods admirably; they do not die of starvation; they generally pass the crisis with an excellent reserve of energy, which usually is shown by their eager desire to be up within a week. Once more listen to Schäfer: "Any small production of energy resulting from the oxidation of alcohol is more than counterbalanced by its deleterious influences as a drug."

I have never seen pneumonia treated by the routine administration of stimulants, though I believe some practitioners still favour this method; nor have I seen enormous doses of 12 and 18 oz. of brandy given in the twenty-four hours in exceptional cases; but as house-physician or physician I have in earlier days often given, or seen given, 6 or 8 oz. in divided doses. I cannot say I ever saw benefit from those quantities; I believe I have seen harm in a few cases, but this I put down as an impression to which none but myself may attach importance. In more recent years, when my practice has been to give little or no alcohol in most cases, but rather to seek for more reliable substitutes, I feel better satisfied with the results. If grave doubts have been thrown on the beneficial action of any drug, still more if there is strong reason to believe it may be deleterious, it is a safe rule in medicine to withhold it. A few years ago a German doctor was tried for malpraxis, for treating a case of pneumonia without alcohol. The judge obtained an authoritative opinion from experts, who said, in the present state of scientific opinion the discretion of the practitioner must be the only guide. A curious parallel this to a prosecution at Coblenz in 1844, when a Dr. Kirchgässer was tried for treating a pneumonic without venesection!

Aufrecht of Magdeburg, in his recently published volume on Pneumonia in Nothnagel's series, declares himself a decided opponent of the giving of alcohol in any routine way. The majority of his cases, especially in private practice, require and get no stimulant, but to decrepit persons coming into hospital, run down through various kinds of privations, he gives some pure alcohol with orange extract, syrup and water (about the equivalent of 2 drms. of whisky) every two hours. As a *pro re nata* stimulant in collapse, champagne is best, but he also recommends very strongly, camphor in subcutaneous injections (6 to 12 grs. in 24 to 48 minims olive oil). Further, in the course of the disease, indications for stimulants not present at first may crop up, such as pallor, rapid wasting, marked lassitude, slight indifference to surroundings, with no great amount of fever. He is not going to throw out the child with the dirty water.

Stursberg¹ has lately reported on the method of treating pneumonia which is in vogue at Bonn (F. Schultze's clinic). Nothing in the Bonn statistics, he says, is in favour of alcohol, though it is given in special cases, as when there is a suspicion of inebriety, or if the patient is accustomed to a beverage, or if the general state makes one think *a priori* that a stimulating treatment is advisable. Camphor (1½ gr. to 3 or more) is recommended as the best analeptic, if the pulse is weak with low tension, or there is cyanosis, or great loss of strength. After it come strong coffee, grog, strong wine or cognac in moderate quantity, not, however, to be preferred to camphor.

Kassowitz² of Vienna argues, in a long paper, that alcohol possesses toxic properties alone, that no substance can play the double rôle of foodstuff and poison, and that camphor is far to be preferred to it as a stimulant, on account of its promptitude of action and its freedom from undesirable complicating effects (intoxication and stupor). Pneumonias especially do well without alcohol. He believes strongly in giving sugar as a real food. It economises albumin and fat, and has been proved by the ergograph to act powerfully and rapidly in stimulating muscle, an effect which no doubt also benefits the heart. Sugar can be given in various forms, as fruit juices, compot, fruit-ice, sweet lemonade, sweetened tea. He does not understand why alcohol should be used with such enthusiasm as a cardiac stimulant, when we have a thousand times seen what a deleterious effect it has on cardiac muscle.

Barr³ of Liverpool says the feverish blood in pneumonia is sufficient stimulus for the heart, without alcohol, which may be reserved for convalescence. Alcohol does not increase the power of the heart, but reduces the blood pressure, already too low. In certain cases, as when the pulse is irregular and small and the vessel walls rather rigid, a small amount may do good. If alcoholic subjects are thought to need something, a good light draught beer or stout containing about 4 per cent. alcohol is safest.

This question of the treatment of alcoholic subjects requires some special consideration. The complication of pneumonia with inebriety is very grave, and it has been a widely accepted dictum that alcohol must be given in such cases. There is no doubt if a man is habituated to the use of alcohol he can take it without the evidence of functional disturbance produced in the non-alcoholic; the tissues tolerate its presence as they may get used to arsenic, morphine, etc. On the other hand, there is a fear that the sudden and complete withdrawal of the stimulant might be followed by a

¹ "Zur Therapie der Croupösen Pneumonie," *Therap. d. Gegenw.*, Berlin u. Wien, 1900, No. 11.

² "Wirkt Alkohol nährend oder toxisch?" *Deutsche med. Wchnschr.*, Leipzig, 1900, Nos. 32-34.

³ *Brit. Med. Journ.*, London, 1900, vol. i. p. 1466.

dangerous depression or even by delirium tremens. The analogy with the stoppage of morphine in morphinomaniacs does not hold, for it is the generally accepted practice that it is best to stop the drug somewhat gradually in these latter, whereas it has been proved best in delirium tremens or habitual alcoholism to stop the alcohol at once and completely.

Aufrecht¹ has extremely favourable results from his practice of stopping the alcohol entirely in delirium tremens, whether occurring with pneumonia or otherwise. My opinion is that it is bad practice to push the stimulant simply because the patient has been a heavy drinker, but in such cases one must be most anxious to support the strength by beef-juice, beef-tea, and milk, to stimulate with strong tea and coffee, to procure sleep and rest, and to bring in drugs such as camphor, strychnine, caffeine, carbonate of ammonia, and digitalis as they seem called for.

I should much like to discuss the employment of alcohol in some other classes of disease, such as wasting diseases (phthisis, diabetes), heart diseases, diseases of children, but I must at present forbear. My conclusion is, that we should clear our minds of prejudices regarding the stimulating and sustaining virtues of alcohol, and substitute for them more accurate ideas. When we prescribe alcohol, let us endeavour, in the light of the most recent scientific knowledge, to exercise at least as much thoughtful care in regard to our patient's welfare, as when we order any other powerful drug, such as arsenic, morphine, or strychnine.

PERNICIOUS ANÆMIA: WITH AN ANALYSIS OF EIGHTY-SEVEN PUBLISHED CASES, AND AN INQUIRY INTO THE AFTER-HISTORY OF TWENTY-TWO REPORTED CURES.

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PERNICIOUS anæmia is happily a rare disease. In six large general hospitals, where there is a medical school and to which such cases naturally gravitate, out of a total number of in-patients of 252,659, of whom rather less than half were medical cases, 249 were suffering from pernicious anæmia. Of these, thirty-seven only are recorded as cured, sixty-nine as relieved, twenty-one as unrelieved, and 122 died. Males are much more frequently affected than females, and this preponderance is much more marked in recent tables, probably because the differentiation of pernicious from other forms of anæmia is more fully recognised.

¹ "Ueber plötzliche Alkoholentziehung bei Kranken und Gesunden," *Deutsches Arch. f. klin. Med.*, Leipzig, Bd. lxxv. Heft 5 u. 6.

Various observers have published tables of the incidence of sex, they appear as follows:—

	Male.	Female.	Total.
Coupland ⁽¹⁾ (1881)	56	54	110
Pye-Smith ⁽²⁾ (1883)	48	59	107
Bramwell ⁽³⁾ (1899)	29	16	45
Osler ⁽⁴⁾ (1894)	17	10	27
Some hospital tables (1888–1897) .	113	61	174
Eighty-seven published cases analysed by myself	60	27	87

In the eighty-seven cases I analysed, the oldest was 73 ⁽⁵⁾ and the youngest 7 ⁽¹⁾. More cases occurred at about 35 to 45 years of age, and this is the conclusion arrived at in other analyses.

The blood in pernicious anæmia.—A drop of blood is not obtained, as a rule, with the same facility as in health, and is more fluid than normal. When obtained it is often of apparently good colour, due, of course, to the high percentage of hæmoglobin, and this high colour is apt to deceive a careless observer. When the drop of blood is examined under the microscope, it is at once evident that there is little or no tendency to form rouleaux, and in all but very exceptional cases there are great changes in the corpuscles. The average size is increased, Eichhorst ⁽⁶⁾ says 8 to 9 micro-mm. is the rule, and in addition the corpuscles tend very markedly to the oval type. In my third case the oval type greatly predominated. Irregular shapes are seen in varying numbers, some kite-shaped or like horseshoes.

Nucleated corpuscles may be present, they were numerous in my third case, and I discovered one in my fourth. Often they are present, but extremely rare, so that they may be overlooked. Cabot ⁽⁷⁾ says two hours' work is often required to find them. They were only mentioned as being present in six out of the eighty-seven cases I analysed, their absence was remarked upon in sixteen, and no mention is made in sixty-five. Cabot divides them into normoblasts, megaloblasts, and microblasts. The last-named he considers to have the same significance as the megaloblasts. The normoblasts are merely immature red corpuscles, and he considers that their appearance in the circulation means that a certain number leave the marrow before they have grown up, and circulate in their immature state for a time. The megaloblasts are abnormally large cells 11 to 20 micro-mm. in size, with one large nucleus filling up most of the cell, and do not occur anywhere in the healthy adult body, not even in the bone marrow.

Cabot (⁷) lays great stress upon the importance of these megaloblasts, and more especially on their proportion to normoblasts. He says, "In all of the sixty cases of pernicious anæmia in which I have examined the blood, the number of megaloblasts has exceeded the number of normoblasts, and as the cases grew worse the megaloblasts grew relatively more numerous (often absolutely as well). Further, in several hundred cases of severe secondary anæmia, I have never yet seen the number of megaloblasts exceed the number of normoblasts."

Eichhorst's corpuscles are occasionally met with in pernicious anæmia. They are about the size of a normal red corpuscle or smaller, and of a deep red, and have not the biconcave shape. Eichhorst (⁶), when he first found them, thought they were pathognomonic, but extended observation has proved that this view is incorrect.

In only six of the eighty-nine cases I analysed were they mentioned, in twenty their absence was noted. Bramwell says he has only seen them in two or three cases. Cabot does not refer to them, but Copeman (⁸) says he has seen them in nearly every case he has observed.

These are the principal changes seen in the red corpuscles in pernicious anæmia, apart from alteration in number. It is clear, I think, that all, except the appearance of Eichhorst's corpuscles, may be referred to overwork and consequent exhaustion of the bone marrow.

I do not mean that the disease primarily arises in the blood-forming tissue, I hope to show that the exhaustion is a necessary sequel of the process by which the disease is brought about. The bone marrow is the seat of blood formation in the adult, and in pernicious anæmia there is always a great overgrowth and alteration of that tissue.

There is not space to discuss the alteration, but, as Muir (⁹) has shown, the more advanced and protracted the disease, the more profound the alterations in the marrow.

Again, these changes in the corpuscles are met with in greater frequency and in greater intensity in the more advanced cases. This is notably so as regards nucleated corpuscles and the irregular shapes. In my third case, where the disease had extended over a longish period, nucleated corpuscles were frequent. On the other hand, in a case of rapid onset which I saw when house physician to Dr. Bramwell, and which he published (¹⁰), Dr. Muir failed to find any nucleated corpuscles though the number of red corpuscles was under one million.

Further, it is only in very profound prolonged cases of secondary anæmia that nucleated corpuscles appear in any number, and megaloblasts then only in very small proportion; these again being cases where the bone marrow has been exhausted by its efforts to overtake the loss of blood. The evidence gained from

observing the blood under treatment still further supports this view. Eichhorst's corpuscles, I think, are probably products of destruction, how brought about I shall show later. They were easily found in the case referred to above, and disappeared when improvement began. That was an exceedingly rapid case, and out of six cases where they were noted in the eighty-seven I analysed, in two the onset was noted as rapid.

It is obvious that if they are products of destruction they would be more likely to appear in the circulation in cases where the destruction is great and rapid, and their disappearance as improvement begins is decidedly against their having anything to do with blood formation, of which, indeed, there is no evidence whatever.

There is a striking diminution in number of the red corpuscles in pernicious anæmia.

In the four cases detailed below, the first count was under $1\frac{3}{4}$ millions in each case, and averaged $1,461,000 = 29$ per cent.

Cabot (7) in sixty-eight cases found an average of	1,200,000 = 22 per cent.
Bramwell (3) in fifteen cases found an average of	1,250,000 = 25 "
Schumann (7) in twenty-eight cases found an average of	1,290,000 = 25.8 "
Published cases analysed, fifty-three cases, gave average of	1,056,000 = 21 "

In no other form of anæmia do we find so low a number of red corpuscles; indeed, a reduction below 2,000,000 is very rare in malignant disease, and if the corpuscles fall so low there is always leucocytosis, and the hæmoglobin is proportionately reduced. It is here that the difference from chlorosis is strikingly shown. Bramwell (3) in eighty severe cases found an average of 3,437,000, and Cabot (7), in 109 cases, an average of 4,112,000.

The last change in connection with the red corpuscles, and from an etiological and diagnostic point of view perhaps the most important, is the alteration in the percentage of hæmoglobin. In no other condition of anæmia is there found, associated with a great fall, in corpuscles a relatively high percentage of hæmoglobin, and consequently a high colour value or index for each corpuscle. In the four cases described the corpuscles averaged 29 per cent., and the hæmoglobin 28.5 per cent., giving a colour index of 0.96.

Cabot (7) and Bramwell (3) found the percentage of hæmoglobin and colour index to be 26 per cent. and 1.04, and 33 per cent. and 1.3 respectively. This is a very opposite condition to that which obtains in chlorosis or secondary anæmia, and is of very great importance, both in making a diagnosis and also in studying the mode by which the disease is brought about.

The white corpuscles are, as a rule, slightly diminished, and increase, if it occur, is never great. This point is of use sometimes in coming to a diagnosis, though a slight increase is not so very unusual. The blood plates seem to be unaffected. The specific gravity is, as would be expected, greatly reduced, and bears a more or less constant relation to the hæmoglobin.

The other clinical features of pernicious anæmia may be divided into groups for the purpose of this paper.

Some are common to all forms of anæmia, and directly due to the disturbance in the economy caused by loss of corpuscles and hæmoglobin. They are loss of the natural colour, some disturbance of digestive function, dyspepsia, and constipation modified by individual idiosyncrasy; palpitations, breathlessness, tendency of fainting, cardial enfeeblement, and consequent dilatation, general languor, headaches, a tendency to œdema, and retention of body fat. These need detain us no longer, they have no special reference to this form of anæmia.

More frequently met with in pernicious anæmia, though in rare instances met with in other forms, are further and more profound digestive disturbances as persistent vomiting and diarrhœa; hæmorrhages, petechial or large; fever (its occurrence in any other form, if uncomplicated, is doubtful); a yellow colour super-added to the loss of the normal colour.

Lastly, changes seen only in pernicious anæmia, early jaundice and some changes in the urine. Of these features it is probable that the hæmorrhages are due to degeneration of the blood vessels; indeed, Mackenzie⁽¹¹⁾ has shown that when the corpuscles fall below 50 per cent. there is a tendency to hæmorrhage, and the longer this is kept up the greater the tendency. The yellow colour, as distinct from jaundice, has been seen in some toxic anæmias, and is probably in them due to absorption of the products of blood destruction. The occurrence of fever in uncomplicated cases of chlorosis or secondary anæmia is extremely exceptional, if it ever occurs. The remaining features, namely, the jaundice, the changes in the urine, probably also the fever, the yellow colour, and diarrhœa, and causeless vomiting, and in addition, the high percentage of hæmoglobin and the presence of Eichhorst's corpuscles, can all be explained by supposing that there is in this disease an increased destruction in the liver or elsewhere. Further, this destruction will furnish the reason for the hypertrophy and exhaustion of the bone marrow.

We must first consider whether there is a normal destruction of red blood corpuscles, and if so, where it occurs. Sir Michael Foster⁽¹²⁾ says, "though we have no means of directly determining the average duration of life of a red corpuscle, it must be short, since the whole quantity of bilirubin secreted in the bile is supplied by the hæmoglobin of red corpuscle, and the production of this must entail a large daily destruction, and though the origin of the main urinary and other pigments is at present obscure, we ought probably to conclude that an additional destruction of red corpuscles takes place, in order to provide an additional quantity of hæmoglobin for these. To meet this daily destruction a large daily birth must also be going on."

This statement will hardly be disputed by any one, I think,

but it is still required to show where the destruction occurs. On this point Professor Schäfer, in answer to an inquiry from me, says, "With regard to the destruction of blood corpuscles, it is generally admitted by physiologists that it must chiefly occur in the liver, though there is not much direct evidence on the point." There is some evidence, however. Nicolaides ⁽¹³⁾ found during digestion a great diminution in blood corpuscles in the hepatic vein as compared with the portal vein, and in fasting animals this decrease was very much lessened. This agrees with Sheridan Delépine's work, which will be referred to later. Noël Paton ⁽¹⁴⁾, in his research on "The Relationship of Urea Formation to Bile Secretion," and on "The Nature of this Relationship," showed that drugs that increase bile secretion also increase the production and excretion of urea, and also that by injecting substances that are known to destroy blood corpuscles into the circulation, there was an exceedingly close relationship between the amount of hæmoglobin lost and the amount of urea excreted (the animals were in a state of nitrogenous balance). It is a point of interest that one of the animals became jaundiced after the injection. A further point of interest is that in experimenting with these blood destroying substances on blood outside the body, he observed changes in the corpuscles which correspond with those described by Delépine as occurring within the liver itself, and that one of these changes was the production of a body exactly similar to Eichhorst's corpuscles, *i.e.* "a small highly refractile sphere," which in its turn became broken up into uniform granules which correspond with those found and first described by Hunter in the liver cells.

Mott ⁽¹⁵⁾ has pointed out that the meconium, which is only bile in a concentrated form, is the outcome of a breaking down of red corpuscles (chiefly the nucleated) in later foetal life. This production of bile, at a time when it can have no function, indicating that it results from the "hæmolytic" function of the liver.

Sheridan Delépine ⁽¹⁶⁾ showed pretty conclusively that the liver cells had what he calls a "ferrogenic" function. He showed that there was a process by which pigment was elaborated in the liver cells, and found in them and the intralobular capillaries and these alone, never being found in portal or hepatic veins, or capillaries, or hepatic arteries.

This pigment might be particulate, *i.e.* precipitated or diffused through the cells, *i.e.* in solution. The iron reaction was most easily obtained at some interval after a meal. The arrangement of the pigment corresponded to that described by Hunter as found in pernicious anæmia. He concluded from his observations that, "after the destruction of red blood corpuscles in various parts of the body," a soluble albumino-ferruginous compound is formed which is elaborated in the liver cells. At first it is soluble and mixed with the raw bile, but then some is precipitated and some

remains in the elaborated bile, and that, when the active secretion of bile ceases, the precipitate pigment is slowly redissolved, and passes back into the blood.

There is nothing in Delépine's observations to urge against the process of destruction being carried on in the liver as well as the elaboration of the products of destruction. On the other hand, he shows that the process is an active one, and occurs chiefly during digestion, and Nicolaidès has shown that there is a loss of corpuscles in the blood while passing through the liver in digestion, and there is nothing (or very little) to show that corpuscles are destroyed elsewhere and their products brought to the liver.

Hunter⁽¹⁷⁾, in his work on pernicious anaemia, has devoted considerable labour to the study of blood destruction. His observations agree in many points with Delépine. He is convinced that there is an active blood destruction, and that the elaboration of the products occurs in the liver, and he is in agreement with Delépine as to the disposition of the granules of pigment and also as to the influence of digestion. His experiments with toluylendiamine led him to the conclusion latterly that the actual destruction occurs in the spleen, and that the products are carried to the liver and then elaborated. He came to the conclusion that the spleen was the actual site, because, when that organ was excised, the effect of toluylendiamine was very slight. Previously⁽¹⁸⁾ he had thought the liver was the site in which the destruction occurred. Schäfer⁽¹⁹⁾ has shown that there is no evidence of any marked alteration in the blood in the spleen as shown by comparing the artery and vein; and further, Hunter's conclusions on this point rest upon his experiment with one drug toluylendiamine on one animal—the rabbit—and Brunton and Delépine⁽²⁰⁾ assert that this drug lessens the "ferrogenic" function of the liver, so the rôle of the spleen is, to say the least, very doubtful.

From the above there can be no doubt that there is normally an active destruction of red blood corpuscles. It is not absolutely certain where it is carried on. The elaboration of the products of destruction is known to go on in the liver, and it would seem reasonable to suppose that the actual disintegration of the corpuscles occurs there. It has been shown that there is great loss of corpuscles in the liver during digestion at the time the elaboration is going on, and Delépine, in normal animals, as opposed to those acted upon by toluylendiamine, found no trace of pigment giving the iron reaction in the vessels leading to or from the liver. If, therefore, the destruction is begun outside the liver, then it can only have gone as far as liberating a body from the corpuscles which does not give the iron reaction, and therefore a body very much like, if not actually hæmoglobin.

There is no evidence of the blood going to the liver being especially rich in hæmoglobin, apart from the corpuscles, and it

seems unlikely that the beginning of a process, the major portion of which we know to occur in the liver, should occur in some other place. Hence I think we may pretty safely conclude that the active blood destruction occurs in the liver.

The next point to be considered is, is there an increased destruction of blood corpuscles in pernicious anæmia?

The idea that pernicious anæmia is due to destruction of blood is old, but Hunter ⁽²¹⁾ has established it on a secure basis.

Evidence on this point we should expect to find in the blood itself, in the excreta, and after death in the two great excretory organs, the liver and the kidneys.

The blood.—There is great diminution of red corpuscles, and there is, as a rule, no obvious cause for this loss, for the majority of cases have no history of hæmorrhage (capillary excepted), and in many cases where hæmorrhage has occurred it has been towards the end, and not at the beginning of the disease. This diminution must therefore be due to diminished production or increased destruction. Of the former there is no evidence. After death the bone marrow is found hypertrophied, and there is every indication of a great effort to produce increased numbers of red corpuscles. It is true that this effort probably results in exhaustion, but that is secondary, as I have pointed out before. We are therefore led to the conclusion, from the state of the corpuscles alone, that there is increased destruction. The hæmoglobin percentage is always high, and the individual value of the corpuscle often above that of normal blood. I am doubtful as to the excess of hæmoglobin being entirely contained in the corpuscles in every case. One is often struck by the fact that the colour of the individual corpuscles is not as high as the hæmoglobin estimate would lead one to expect. Handford ⁽²²⁾ has observed the same thing, and Broadbent ⁽²³⁾ noted that in one case the blood stained the finger most tenaciously. This all points to some colouring matter, hæmoglobin, or a derivative indistinguishable from it by colour tests, being carried in the serum in some cases, or else that it is carried to so great an excess in the individual corpuscles that they easily part with some of it. This would explain the primrose yellow colour of the skin so often seen, for we can only explain this by supposing that the colouring matter of the blood transudes into the skin.

It will be remembered that Noël Paton and Hunter both described as products of blood destruction—artificially obtained, it is true—bodies exactly similar to Eichhorst's corpuscles. There is little doubt, I think, that these corpuscles are products of blood destruction. In a case before mentioned ⁽¹⁰⁾ they were especially numerous. That case was an exceedingly rapid case, and as far as I have been able to discover, all these points, namely, high hæmoglobin percentage, colouring matter in the serum, yellow colour of the skin and the presence of Eichhorst's corpuscles, are

all most marked in cases that are pursuing a rapid course. This is quite consistent with Delépine's view of the ferrogenic function of the liver, and would be caused by an exaggeration of that function, namely, during an increased destruction of blood so much hæmoglobin is broken up, that in some cases there is more than the corpuscles can hold or the bile remove, so that part of it is carried in the serum, and at times corpuscles in the process of being broken up escape into the serum as Eichhorst's corpuscles. It is quite possible that in this high percentage of hæmoglobin lies the explanation of patients continuing to live when the corpuscles are reduced to so low a point as half or three-quarters of a million per cm.

Turning now to the excreta, we must consider the state of the fæces and the urine. Observations on the fæces are rare; there is usually a statement that they are normal; only one case has been recorded, by Gibson (²⁴), where the fæces were colourless. It is well to remember, however, that the diet is usually farinaceous food and milk, so that a dark-coloured stool, if present, indicates an excessive development of pigment.

The bile may be considered for the present purpose as a mere excretion. Here again observations are far from numerous, but there are some of importance.

Jaundice is met with in some cases, usually associated with some enlargement of the liver, and this again, I am convinced, is most marked in cases that are pursuing a rapid course, and especially if the onset be rapid too. This was the state of affairs in my second case, and also in Dr. Bramwell's case referred to before. In these cases the stools maintained their colour, showing that there was no complete blocking of the bile passages. Mott (¹⁵) found in the gall bladder of a case where destruction had been extremely rapid, that the bile was "thick and tarry," and Hunter (¹⁸) records a similar observation. Pye-Smith (²), Hunter (²¹), and Broadbent (²³), all record cases which became worse, and at the same time the yellow colour of the skin increased or reappeared, and in each case there was diarrhoea. In Hunter's case the fæces and urine became dark during the exacerbation, and in Pye-Smith's case the red cells were greatly diminished after the exacerbation. Hunter (¹⁸) quotes some experiments of Stadelmann and Affanasiev, which showed that artificial blood destruction with toluylendiamine is associated with jaundice, and in these cases it was due to a greater proportion of solid parts of the bile, making movement difficult.

The explanation of the jaundice is to be found in the increased production of bile pigments, which we know are the result of blood destruction. The increase of bile is in these cases more than can be naturally got rid of, and so jaundice occurs.

It is possible and probable that in many instances the vomiting and diarrhoea are due to the function of the liver being dis-

turbed. Vomiting is intimately associated with any derangement of the liver, and it is noticeable that the vomiting is most marked in any exacerbation. The diarrhœa is due in all probability to accumulation in the liver and duodenum of the bile generated to contain and carry away the excessive amount of pigment, with the result that a strong effort is called for to remove it; in short, the destruction of blood induces a cholagogue action, a point to which Hunter has drawn attention.

There is still more to be learned from the morbid anatomy of the liver. Hunter (¹⁸) first drew attention (though others had noted it) to the deposit in the liver of a pigment giving the iron reaction in this disease, and also showed that in no other condition is pigment found to such an extent. The pigment is uniformly distributed in the cells and the outer two-thirds of the lobule, and lies in close relation to the bile capillaries. In short, the pigment corresponds exactly with that described by Delépine as evolved from hæmoglobin in the normal liver, except in its excessive quantity and persistence. The normal amount of iron in the liver is variously stated at from 0.070 to 0.1. I have found twenty-two analyses of the liver in pernicious anæmia, and of these the average is 0.581, the highest being 2.1, and the lowest 0.140 (of this case the diagnosis is rather doubtful), the next lowest was 0.190. This excess is not invariably present, but exceptions are rare. In my first case none was found (a quiescent case), in another the patient seemed cured and died of pneumonia, and no pigment was found, and it is obvious that it will depend upon the activity of destruction about the time of death, and also upon the care in examining the liver (see Kelynack (³¹)). Considerable discussion has arisen about this pigment, but Hunter has conclusively shown that in pernicious anæmia it appears in quantity rarely approached and never exceeded in any other condition, and that it must be due to blood destruction.

The urine.—Not much attention was paid to the urine until Hunter (²⁵) drew attention to the frequency with which a dark urine, coupled with a low specific gravity, was present in this disease. This dark colour is not always present. In my first two cases I made no note on the subject, in the third it was a marked feature, in the fourth it was very noticeable on one day and absent two days after. When carefully looked for it is generally found at some period of the disease.

Hunter (²⁶) and Hopkins (²⁷) observed the urine becoming much darker during exacerbations of the disease; this occurred also in my third case. And, on the other hand, the colour has been observed to become normal in cases that respond to treatment (see notes 10 and 2). The exact nature of the pigment is not settled, but in some cases pathological urobilin has been described, *e.g.* Mott (²³), Hopkins (²⁷), and Hunter (²⁶). Very few analyses of the urine have been made to estimate the amount of iron

excreted, and these are inconclusive so far as showing excess in the disease.

Similarly, as regards urea, there are not many definite statements, but there is a general agreement that, taking into consideration the condition of the patient (food, presence of vomiting, and diarrhoea), there is a marked increase of urea excretion (Pye-Smith⁽²⁾, Osler⁽²⁹⁾, Mott⁽³⁰⁾, etc.). Osler also states that uric acid is in excess frequently, a point in which Branwell⁽¹⁰⁾ agrees with him, and Mott⁽³⁰⁾ has suggested that uric acid is a product of disintegrated red corpuscles. In many cases, pigment giving the iron reaction has been found in the kidneys, situated in the convoluted tubules and the broad part of the loop tubule of Henle, and in no other condition is this found. Hopkins⁽²⁷⁾ has pointed out that this is the usual site for excretion of foreign particles of pigment, and that in hæmoglobinuria the hæmoglobin is found in the glomeruli. It will thus be seen that the evidence from the urine and kidneys is of great value, though not constant. The excess of pigment and urea, and the deposit found post-mortem, can only be explained by supposing that products of destruction are being excreted by the kidney, and the appearance and disappearance of these phenomena indicate respectively an increase and a decrease in the destructive process.

As a general rule, little or no alteration is found in the spleen during life or after death. Usually the percentage of iron is not increased, but Mott⁽¹⁵⁾, Hunter⁽²⁶⁾, and Hopkins⁽²⁷⁾, have recorded cases where the increase was considerable. Kelynack⁽³¹⁾ found no increase, and none was found in my first case.

This variation may be, and probably is to be, accounted for in the actual state of blood destruction at the time of death. In both Mott's and Hunter's cases there had been all signs of an extreme amount of destruction for some time preceding death, and it is partly on this case that Hunter based his belief that blood destruction occurs in the spleen. I think it is possible to explain these cases in another way, namely, there has been so great an amount of destruction in the liver that the products of destruction (hæmoglobin and its derivatives) have been forced into the general circulation, and have accumulated in the spleen, possibly stored up there until the liver is able to remove them. In support of this there is the fact that physiologists generally do not assign to the spleen any part in blood destruction or formation, basing their belief on comparison of the blood in the artery and vein. Further, it is to be noted that Hunter found hæmoglobin in great excess, and the corpuscles in very small number. If the corpuscles were to be slaughtered in the spleen, one would expect them to be collected there in large numbers, but the very reverse was the case.

From the evidence collected above there can be no doubt of two things, namely, that in health there is an active destruction of red blood corpuscles, and that in pernicious anæmia this

destruction is increased, the amount of increase determining the severity of the case (to some extent modified by the activity of the blood-forming tissue). Little doubt can exist, I think, that this destruction occurs in the same place in each case in health and disease, and that the place of occurrence is the liver.

What then is the cause of the increased destruction in pernicious anæmia? Mott⁽¹⁵⁾ has suggested that possibly pernicious anæmia is caused by an exaggeration of the "ferrogenic function" of the liver, in an analogous way to the theory of the production of diabetes by a disturbance of the glycogenic function of the liver. He observes that peptone has a very marked effect on the blood, and that "it is possible to conceive that, if this substance when it was absorbed were not changed, it might lead to such an alteration of the portal blood as to give rise to increased hæmolysis. In this connection, I may state that the liver and spleen of a dog which had been injected with peptone solution yielded the iron reaction very markedly, but this may have been accidental." A similar suggestion was made by Jones and Brunton⁽³²⁾, namely, "that it is possible that some abnormal product of digestion or even some digestive ferment itself may act as a poison." Hunter⁽²⁶⁾, who has spent much time in the study of the disease, came to the conclusion that "there is produced in the gastro-intestinal tract a poison of cadaveric nature in small quantity and not constantly, and that this is the cause of the disease." In his further research on the urine, he demonstrated that there is a great increase of the aromatic sulphates in the disease, in which Gowland Hopkins⁽²⁷⁾ agrees with him, and he also separated two bodies indistinguishable from putrescine and cadaverine, which he says have been found in the urine in no other condition, and as these two ptomaines are bacterial products, he considers that their discovery points to some special organism being concerned in their manufacture. He further concluded that the increase of the aromatic sulphates denoted increased putrefaction in the gastro-intestinal canal.

In opposition to this idea, Hopkins has suggested that it is quite possible that the increase of the aromatic sulphates is merely the result of the destruction of red corpuscles in excess, and not as it were a by-product of the causal agent; and Mott⁽¹⁵⁾ also says the aromatic compounds are merely an expression of breaking down of tissues, and questions whether the increase of sulphates would not occur in any case where there is rapid tissue waste. Further, he points out that in many diseases there is ulceration of the intestine for months or years, the intestines must swarm with organisms of all kinds, and everything is favourable to the absorption of their products, and yet pernicious anæmia does not occur. Still further, when there is faecal poisoning resulting from constipation, the corpuscles are not broken down, but insufficient colouring matter made. Again, the toxic phenomena which were

so prominent in one of Hunter's cases, and which he considered to support his belief so strongly, are not by any means constant—indeed, they are very rarely well marked.

Still more recently, Hunter (³³) has published a further development of his theory. In a series of eight cases he was struck with the prominence of marked dental caries, stomatitis, and gastritis, and he emphasises the point that they were most marked at the beginning, when the anæmia was slight.

He considers that the stomatitis and glossitis in these cases, by the mode of onset, character, and progress, denote their infective nature, and also point to an infection of a definite character localised to the alimentary tract. He makes a point of the periodicity of the stomatitis, and argues that it is quite possible for an infective process to go and come lower down, and in a similar way leave no trace. He now would define the disease as “a chronic infective disease localised to the alimentary tract, caused by a definite infection of certain parts of the mucosa of the alimentary tract, chiefly of the stomach and occasionally also of the mouth of the intestine.” Hunter grants that dental caries is in itself far too common to be the actual cause of the disease, but suggests that around the carious teeth the “special infection,” probably a “mixed infection,” is formed, and in time infects the mucosa of the mouth, stomach, etc.

This theory cannot be considered yet as complete. So far Hunter has shown no special organism, and does not suggest that those found—the ordinary pus organisms—are solely responsible. Then, again, the evidence for the infective gastritis is slight. Gastro-intestinal lesions visible to the naked eye are rare. Hunter thinks the microscope would reveal more, and thinks the vomiting and diarrhœa suggest their presence. It is possible, however, for these to be caused in another way, as I have pointed out.

So far Hunter has only found stomatitis referred to in eighteen out of two hundred cases, though of course it is quite likely that it occurs more often; it is a point easily omitted in notes, as also is the occurrence of dental caries. In my last case there was evidence of a suppurative process in the mouth at a previous time, and in the third case there were suppurating stumps and a purulent pharyngitis, and also a stomatitis that came and went; indeed, the third case is a very complete example to illustrate the theory, except that the patient had no dyspeptic symptoms till near the end. Further support to the theory is found in the case published by Elder (³⁴), where apparent complete recovery was obtained with antistreptococcic serum (Dr. Elder tells me his patient was still in good health in November, 1900); and in my third case the administration of salicylic acid, and the use of a mouth wash and gargle of the same apparently reduced the destruction of blood, as shown by the colour of the urine. At the same time there are cases in which no symptoms have arisen pointing to the mouth as

their seat of origin, of which my first two cases are examples, though it must be allowed that no special examination was made of the mouth.

Our knowledge of the cause of pernicious anæmia is very far from being complete, but it is slowly advancing. There is a general agreement that it is caused by an excessive destruction of blood, and that this destruction takes place within the portal circulation, and that the liver is the organ chiefly concerned in disposing of the products; and if we except Hunter, who believes that the destruction occurs in the spleen, there is a pretty general agreement that it occurs in the liver. As to the actual factor which brings about this excessive destruction, we are still in the stage of theory.

Hunter's theory is more fully worked out than any other, but before it can be accepted entirely, it must be shown that in every case there exists this infective condition, and further evidence is required to show what really is the product of the infective condition that destroys the red cells.

I have not referred to the views of those who hold that pernicious anæmia is merely an advanced stage which may be reached by any case of anæmia. I am convinced that pernicious anæmia is a disease by itself distinct from all other forms of anæmia. The points in common between all cases of pernicious anæmia are so numerous, and at the same time so different from what is seen in some severe secondary anæmias, that there can, I think, be no doubt of the existence of a distinct disease which we call pernicious anæmia.

Prognosis.—"With perhaps a single exception, the disease, in my own experience, resisted all remedial efforts, and sooner or later terminated fatally." These words of Addison⁽³⁵⁾, written more than fifty years ago, are unfortunately equally true to-day of the experience of every one, except so far as they refer to treatment; here, happily, there is some modification. Bramwell⁽¹⁰⁾ says: "In one of my cases (there were forty-five) the patient remained well for twelve years, and then relapsed and died of the disease. . . . In no other of my cases in which the result is known has the patient lived more than three years after he first came under my observation; in one case death was due to an intercurrent attack of pneumonia. . . . In three cases only in which the ultimate result of treatment is known, do the patients still survive; two of them are in good health." Osler⁽⁴⁾ says: "Of twenty-seven cases (up to January 1895), four were then under observation, two of them having recovered under arsenic; of the remaining twenty-three, four of the post-partum cases recovered, and when I left Montreal three of these had remained in good health for several years. Of the remaining eighteen cases, two were lost sight of, one having improved very much. The remaining sixteen were dead. Six of these fatal cases re-

covered from the first attack." Hale White⁽³⁶⁾ says: "With one exception, there is no evidence that any of the cases which have been discharged from Guy's Hospital during the last ten years as having improved have recovered at least for any length of time." Out of ten cases, one left no address, six could not be found, the eighth had died, another was known to die soon after leaving hospital, and the tenth was alive and well four years after. Dr. Hale White tells me that he has been unable to trace him since. Pye-Smith⁽²⁾ collected, in 1882, twenty recorded cases of cure up to date. Hale White⁽³⁶⁾ states that one of these cases, treated with arsenic in 1880, was alive and well in January 1890, though he had had relapses. Of this patient I obtained further record from Dr. Taylor of Hove, who writes: "March 18, 1900. He is now alive and well; seventy-two years of age. He has recently made a complete recovery from influenza." This is the longest authenticated case of cure I have found.

Dr. Richard Cabot of Boston, Mass., in answer to an inquiry from me, writes: "February 6, 1900. Of the 104 cases of pernicious anæmia which I have seen, not one, so far as I know, has lived over four years. Some have been lost sight of and may possibly be alive, but every one that I have been able to follow up has died within that period. The 'cured' cases represent, I believe, simply one of the remissions of the disease, during which the patient passed out of observation, so that the subsequent death was not heard of."

Dr. G. A. Gibson informs me that there was a fatal result in every one of his cases treated antiseptically, after apparent recovery in each case. Sometimes the end came very suddenly, very soon after recovery, at other times after the lapse of years. From the examination of the statistical tables of various hospitals, extending over a number of years, I found 266 cases of pernicious anæmia. Of these, thirty-seven, or 13·9 per cent., were put down as cured, and 131, or 49·2 per cent., died in hospital, the remainder being put down as relieved (seventy-seven, or 28·9 per cent.) or unrelieved (twenty-one, or 7·89 per cent.). Of these thirty-seven cured, many would be suffering from the first attack.

I found in the various journals twenty-two cases published as cures within recent years. I endeavoured to find the after-histories of these cases by writing to the original observers, and I wish here to thank them for their courtesy, and the considerable trouble they took in the matter. Of these twenty-two, one (No. 2) was known to be alive and well. Nine are known to have died of the disease, four had been completely lost sight of. Of three, I could gain no further information, the reporters of two being dead. The remaining five are known to have lived for some time, and their deaths have not been heard of by the original observers.

CASE 1 (F., æt. 42).¹—Treated with arsenic in increasing doses, with result of steady progress to cure.

After-history.—Lost sight of.

CASE 2 (M., æt. 64).²—A long-standing case, treated with arsenic and cured.

After-history.—Dr. Strachan writes: “*February 8, 1900.*—Mr. C. is enjoying better health than before his severe illness. For several years he took arsenic every alternate month; has long stopped all treatment except simple dieting. He is now seventy-six, looks fresh and healthy, and leads a fairly healthy life.”

CASE 3 (F., æt. 44).³—Recovered steadily under arsenic.

After-history.—I was unable to obtain any.

CASE 4 (F., æt. 21).⁴—Transfusion afforded temporary relief, and arsenic (up to min. 36) cured her.

After-history.—Dr. Lockie writes: “*February 4, 1900.*—Patient was shortly afterwards the subject of another relapse, and died before another transfusion could be effected. I cannot remember whether she took arsenic in the interval.”

CASE 5 (M., æt. 17).⁵—Red corpuscles fell to 164,000, and hæmoglobin to 10 per cent. Treated with arsenic (liquor) up to 1 drm. in the day; he recovered, though the arsenic caused pigmentation herpes and vomiting.”

After-history.—Dr. Handford writes: “*January 30, 1900.*—Was last heard of in the end of 1895 (four years after onset). Was then a hard-working robust farm labourer, weighing nearly 12 stones, and showing no signs of anæmia. I should probably have heard if his illness had returned.”

CASE 6 (M., æt. 58).⁶—Treated with arsenic up to 36 min. daily and 45 gr. citrate of iron, and was discharged cured.

After-history.—Dr. Russell writes: “*January 31, 1900.*—Patient had a relapse and died, but I am unable to say whether he was again treated with arsenic.

CASE 7 (M., æt. 60).⁷—Treated with ferrous chloride arsenic, salol and bone marrow; benefit resulted from the last alone, and it cured him.

After-history.—Professor Fraser writes: “*February 9, 1900.*—He left the hospital well in May 1894, and continued well until July 1894, when he became ill after exposure to cold and damp. There was much deterioration in the state of the blood, but treatment with bone marrow soon produced a rapid improvement to the former satisfactory state. Patient did not continue the bone marrow as directed, and after a severe exposure to cold and damp, pleurisy and bronchitis supervened,

¹ Broadbent (*Brit. Med. Journ.*, London, 1880, vol. ii. p. 508).

² Strachan (*ibid.*, 1888, vol. ii. p. 982).

³ Suckling (*ibid.*, 1889, vol. i. p. 20).

⁴ Lockie (*ibid.*, 1890, vol. i. p. 130).

⁵ Handford (*ibid.*, 1891, vol. i. p. 1381).

⁶ Risien Russell (*ibid.*, 1894, vol. i. p. 298).

⁷ Fraser (*ibid.*, 1894, vol. i. p. 1172).

and there was a return of vomiting and diarrhœa, and he died in November."

CASE 8 (M., æt. 55).¹—Arsenic could not be tolerated, iron was useless, transfusion of very temporary benefit. Betanaphthol was then administered and steady improvement followed, and seven months later patient was in good health.

After-history.—Dr. Gibson writes: "November 24, 1899.—The patient died of a relapse some time after."

CASE 9 (M., æt. 43).²—Patient was treated with arsenic up to 75 min. a day. There was some improvement, but very severe peripheral neuritis followed. Bone marrow was given, and the red corpuscles improved to 100 per cent., and eventually the neuritis disappeared.

After-history.—Dr. Barrs writes: "January 30, 1900.—The man was seen alive and well two years or more after he left the hospital. He was a miner, and therefore would be difficult to trace."

CASE 10 (F., æt. 24).³—A severe case. Iron for three weeks was ineffectual. Arsenic cured her.

After-history.—I was unable to obtain any.

CASE 11 (M., æt. 61).⁴—A typical case, cured by arsenic.

After-history.—Dr. Pye-Smith writes: "February 8, 1900.—He died soon afterwards, but I do not remember the circumstances."

CASE 12 (M., æt. —).⁵—Iron was useless, but recovery followed the administration of arsenic.

After-history.—I was unable to obtain any.

CASE 13 (M., æt. 45).⁶—A typical case. Arsenic and arseniate of iron did no good, though tried for a month. Dried sulphate of iron was then given, and a steady recovery ensued.

After-history.—Professor Finlay writes: "February 8, 1900.—The man was under my care on two or three subsequent occasions for relapses. He lived, if I remember rightly, for four or five years."

CASE 14 (F., æt. 26).⁷—A typical case, cured by arsenic.

After-history.—All trace of the patient lost.

CASE 15 (M., æt. —).⁸—Various treatment was tried, but with no success until arsenic was given, and that cured the patient.

After-history.—Dr. Barton sent me his notes. The patient had a relapse six months later, but recovered under arsenic, and two months later described himself as "quite well and brown with the sun, and could pull six miles at sea without fatigue;" after that he was lost sight of.

¹ Gibson (*Brit. Med. Journ.*, London, 1892, vol. ii. p. 132).

² A. G. Barrs (*ibid.*, 1895, vol. i. p. 398).

³ Mitchinson (*Lancet*, London, 1881, vol. i. p. 14).

⁴ Pye-Smith (Sheffield) (*ibid.*, 1883, vol. ii. p. 993).

⁵ Padley (*ibid.*, 1883, vol. ii. p. 811).

⁶ Finlay (*ibid.*, 1885, vol. i. p. 374).

⁷ Broadbent (*ibid.*, 1889, vol. i. p. 75).

⁸ Barton (*ibid.*, 1891, vol. ii. p. 287).

CASE 16 (M., æt. 28).¹—Arsenic did good, but caused diarrhœa and was stopped. When patient was apparently *in extremis*, transfusion of blood was most successful, and under arsenic again, with iron, quinine, and raw meat, a cure was effected.

After-history.—Dr. Evans writes: "*February* 8, 1900.—Unfortunately he went to London for a trip (150 miles by rail), diarrhœa recurred almost directly after, and anæmia returned rapidly. Transfusion was performed, but he died twenty-four hours after. The subsequent family history is peculiar. The brother developed Graves' disease and was ill a long time. The mother for four or five years suffered from recurrent anæmia, and recently died."

CASE 17 (F., æt. 53).²—Cured by arsenic and iron.

After-history.—The patient was alive six months after leaving hospital. Dr. Smart writes: "*February* 12, 1900.—With the exception of hearing indirectly of her continued improvement, I have lost particulars of her case."

CASE 18 (F., æt. 49).³—A typical case. Excess of hæmatoporphyrin was found in the urine. Bone marrow was tried with no success. Arsenic cured, though it caused some neuritis.

After-history.—Dr. Hunt writes: "*February* 12, 1900.—The case . . . remained well for I think two years, and then relapsed, and I believe ultimately died."

CASE 19 (M., æt. 53).⁴—A rapid case, with every appearance of extreme blood destruction. Arsenic up to 1 drm. a day was given, and no other treatment. A complete recovery followed, with some herpes.

After-history.—In March 1898 had a slight relapse, having ceased to take the arsenic as ordered. Dr. Bramwell writes that he died on February 1, 1899.

CASE 20 (M., æt. 13).⁵—A typical case, red corpuscles as low as 624,000. Iron, salol, and small doses of arsenic were useless. Large doses of arsenic, 12 minims, t.i.d., and massage proved very successful.

After-history.—Alive and well thirteen months after (*i.e.* 1898). Dr. Gladstone writes: "*February* 8, 1900.—I have not seen the patient since November 1898. He had been following his employment as messenger, and was apparently quite well."

CASE 21 (F., æt. 37).⁶—Iron and stomachics were useless. Arsenic caused a steady improvement.

After-history.—Dr. Willcocks writes: "*February* 7, 1900.—She left hospital practically well, but I am sorry to say I lost sight of her."

CASE 22 (M., æt. 41).⁷—A case successfully treated with phosphorus.

¹ Evans (*Lancet*, London, 1893, vol. i. p. 1133).

² Smart (*ibid.*, vol. i. p. 403).

³ Hunt (*ibid.*, 1896, vol. i. p. 284).

⁴ Bramwell (*ibid.*, 1897, vol. ii. p. 197).

⁵ Gladstone (*ibid.*, 1898, vol. i. p. 103).

⁶ Willcocks (*Practitioner*, London, 1883, vol. xxxi. p. 106).

⁷ Broadbent (*ibid.*, 1875, vol. xiv. p. 22).

After-history.—Sir William Broadbent writes : “ February 6, 1900.—I am sorry that I cannot identify the cases to which you refer (Nos. 1, 14, and 22), but most . . . have ultimately died of a relapse, though some have lived many years.”

These cases were in every way typical, and it is interesting to note that, though various agents brought about the cure (arsenic, 15; arsenic and transfusion, 2; bone marrow, 2; iron, phosphorus, and betanaphthol, 1 each), in the only two that are known to be alive arsenic was the successful agent.

The after-history of these cases, therefore, confirms the gloomy prognosis of the disease. The fact that the original observer in so many instances kept in touch with the patients, for the most part hospital patients, shows what an impression the fact of an apparent cure made upon him. We must therefore look upon a relapse as almost inevitable in those cases which respond favourably to treatment, and that death will almost certainly occur within the next four years at the outside.

(To be continued.)

CLINICAL RECORDS.

CASE OF CLEFT PALATE; STARVATION; FEEDING BY GAVAGE; RECOVERY.

By ALEXANDER VEITCH, M.B., *Edinburgh.*

FOR the years 1897, 1898, and 1899, the Registrar-General records twenty-four deaths from cleft palate and hare-lip as having occurred in Scotland. That this number represents the total deaths from these deformities may be doubted, since under the various headings, Atrophy, Debility, and Inanition, others may have been included. It is sufficient for the purpose of this paper that the mortality is a substantial one; and the question arises, “Can this mortality be reduced?” The case here recorded warrants a reply in the affirmative. Where death has resulted from cleft palate, it may be assumed that the cleft was a severe one, defying the usual methods of feeding, namely, the feeding-bottle with the elongated teat and the spoon, and causing death by starvation. While it is evident from the Registrar’s returns, that the severer cases may end fatally, the surgical clinics afford ample evidence of the suffering from partial starvation entailed on the victims of these deformities. It is indeed proverbial that such patients are presented for operation in an enfeebled condition, and it is no uncommon thing for the surgeon to defer operation for this reason. There seems little room for doubt, therefore, that the methods of feeding such infants generally practised are but partially successful, a considerable number of them suffering from starvation more or less complete.

CASE.—D. C. V. S., æt. 11½ weeks, female, was brought to me, June 17, 1900. The mother explained that the child suffered from cleft palate, was visibly losing flesh, and cried unceasingly. At birth she had been a "full-sized child." Inquiries elicited the fact that numerous and quite proper dietaries had been tried, but without success. Examination verified the presence of severe cleft palate. The child was greatly emaciated, weighing 5 lb. 2 oz. Observation of the process of feeding showed that the bulk of the food introduced into the mouth was partly ejected through the nostrils and partly coughed up. Starvation was accordingly diagnosed, and arrangements made for the proper feeding of the child. The food selected consisted of milk, 5 oz. ; water, 10 oz. ; cream, 1 oz. ; sugar of milk, 2 drms. These ingredients were placed in an Aymard's steriliser, and peptonised with Fairchild's peptonising powders. A No. 12 soft rubber urethral catheter, fitted to a glass piston syringe of 1½ oz. capacity, filled with the food, was introduced into the stomach. Through this the food was carefully injected. In the early days, 3 oz. (two syringefuls) were introduced at intervals of two hours. This quantity was gradually increased to 4½ oz. After a time the peptonisation of the food was stopped, the relative amount of water decreased, and the sugar of milk increased.

The following table gives the daily quantity of food administered, and the weight records:—

Date.	Amount of Food given on date named.	Weight.
June 17 . . .	...	5 lb. 2 oz.
" 18 . . .	...	5 " 2½ "
" 19 . . .	...	6 "
" 20 . . .	33 oz.	6 " 6 "
" 21 . . .	37 "	6 " 9½ "
" 22 . . .	38 "	6 " 12½ "
" 23 . . .	27 "	6 " 15 "
" 24 . . .	33 "	7 "
" 25 . . .	30 "	...
" 26 . . .	35 "	7 " 5 "
" 27 . . .	36 "	...
" 28 . . .	37½ "	7 " 11 "
" 29 . . .	33 "	...
" 30 . . .	34½ "	7 " 12 "
July 1 . . .	34 "	...
" 2 . . .	36 "	8 " 1 "
" 14 . . .	37 "	9 " 4 "
Aug. 4 . . .	36 "	11 " 4 "
" 29 . . .	35 "	13 "

Assuming the child to have been of average weight at birth, namely, 6¾ lb., and granting an average daily gain of ⅔ oz., this child, on June 17, should have weighed 10 lb. As a matter of fact, it weighed but half this amount. Yet by the end of August, the child, with proper feeding, had reached a healthy level.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

The Pathology of Mental Diseases. By W. FORD ROBERTSON, M.D.,
F.R.C.P.Ed. Edinburgh: William F. Clay. 1900.

DR. FORD ROBERTSON has undertaken a task of no small difficulty, and has accomplished it in a manner deserving of all praise. The book is not outside criticism, but is one the production of which any man might be proud of. When one remembers that it emanates from an investigator who is still to be regarded as a junior member of the profession, one cannot refrain from congratulating the author on his early maturity of thought and judgment, and on his indefatigable industry.

Deep research into the literature of nerve anatomy, physiology, and pathology has been brought to bear on the book: were it merely for its bibliography it would be a valuable aid to the student. In the list of some five hundred British and foreign authors, exception can be only taken here and there as to the value of references; very few papers of importance have been omitted; and an even smaller number of doubtful authority have been introduced. Literary research, however, has only been auxiliary to laboratory work.

Every one who has had opportunities of watching the gradual development of Ford Robertson's work as he laboured in his laboratory, and of observing the elaboration of his methods and their beautiful results in manifestation of structure in health and disease, was prepared to anticipate in his book brilliant demonstrations; but we are not quite so sure that we were prepared to expect that the bearings of such demonstrations on the general pathology of the insanities would be so definite and valuable. Such, however, is the fact. The author does not claim to attempt to cover the whole extent of pathology in relation to the insanities—to do which would only have involved him in a maze of conjectures. Nevertheless he has pushed forward the "advanced works" on positive lines to a distinctly appreciable extent, and has given, to say the very least, indications of the roads by which the fortress can be most readily approached. Let one instance be taken. The writer remembers the time when any suggestion to the effect that implication of the intracranial lymph system, and consequent arrest of flow, might account for the production of morbid mental symptoms, was jeered at, and the view that the brain tissues were liable to be injured by the products of waste and disease was regarded as visionary. Primary intoxication was of course admitted, but the theory of secondary intoxication was set aside. As step by step the cerebral lymph apparatus was demonstrated,

this view gained ground. In this book it is well worked out. It is unnecessary here to follow the line of argument, which consists of a series of anatomical, physiological, and pathological data ; suffice it to say that, founding on the work of previous observers, and on much careful original work, he leads up to the conclusions contained in the important, but all too short, final chapter of the book, in which the rôle of toxic agents in the production of cerebral disease is set forth. The only fear is that the prominence given to the factorship of infective and auto-intoxicants by the modern school may obscure the vision as to the action of other morbid influences ; on the other hand, there can be little doubt but that when a real pathological classification of the insanities is promulgated, the toxic class will include a very large proportion.

It is needless to attempt to direct the attention of the reader to any special section of the book. The anatomist and physiologist will be interested in the description of the neuroglia, and especially in the differentiation between the epiblastic and mesoblastic glia cells. The existence of the latter structures is an original observation of the author. The student will be thankful that we have at last a full and perfect description of the meninges and their relations. In like manner a great service has been rendered by the introduction of an elaborate yet concise demonstration of the cerebral cells and their relations. It may be suggested that in future editions more attention should be paid to the interruption of connections.

Whilst always expressing his views with characteristic modesty, Dr. Robertson does not hesitate to set his foot down firmly when the subject under discussion is of primary importance. Thus he combats, and we think successfully, certain of the conclusions of Leonard Hill and others as to the vexed question of intracranial pressure, although here certain of his arguments might be strengthened. All are not, however, prepared to accept the discarding of Bevan Lewis' views as to the action of glia cells in the lymphatic system. This is an important theory, and cannot be set aside without further study and observation.

There are many other subjects which one would have liked to consider, but this cannot be done within the space of a critique. We would only say that the book is of the utmost importance, that it brings up to date all that is known on the subject, that it is written in the best scientific spirit, and is permeated by a generous recognition of the work of earlier observers.

The only serious fault we have to find is in connection with the title. We have here a book, the avowed and definite object of which is to show that morbid mental symptoms are the result of implications of the cerebral tissues. This is the leading actuating principle manifest in every page, except the title-page. There we are told that the book treats of "Pathology in relation to Mental Diseases"; not, be it marked, "mental disease," but "mental diseases." This implies not a single fallacy, but a multiplication of fallacies. No one would for a moment think of accusing the author of intentionally playing up to a popular misconception ; but the fact remains that he is doing so : he is obscuring the main issue, and thus retards the public mind from arriving at an intelligent knowledge of what the real issue is. So long as authorities tell the public in set phrase that there are diseases of the mind, they may

preach and write about the organisation of the material substratum as long as they please, and yet fail to convey in the proper direction the impression which it is so desirable for the public to acquire. Until the people have grasped the idea that mental alienations are merely indications of many and various underlying morbid somatic conditions which should be treated on the general principles of medicine, we cannot look for any material advance in the treatment of the insanities, over and above that at present existing. It may be asked, would the author have done better had he entitled his book, "Pathology in relation to the Insanities"? Yes, for by so doing he would not have committed himself to a fallacious theory; and would have employed a generic term belonging to the same category as "fevers," "dropsies," "asthma," none of which do more than convey the idea of a leading symptom of an underlying morbid condition.

JOHN BATTY TUKE.

The Theory and Practice of Hygiene. By NOTTER and HORROCKS.
Second Edition. London: J. & A. Churchill. 1900.

NOTWITHSTANDING the large number of books dealing with hygiene and public health subjects which have been published during recent years, it is gratifying to find that the great work so intimately associated with the name of Parkes and the Army Medical School of Netley still holds its own. This is due, first, to its great excellence, both as regards the contents and method of arrangement; and, secondly, to the eminence as sanitarians, and the marked ability of those who have followed Parkes in carrying on the work in subsequent editions. This duty devolved primarily upon de Chaumont, and latterly upon Notter and Firth, while in the present volume the name of Horrocks appears in place of Firth, who was unable to assist in bringing out the present edition, owing to absence from this country.

It is perhaps scarcely fair to describe the book of Notter and Firth published in 1896—of which the present volume is the second edition—as more than a distant descendant of Parkes' famous *Hygiene*, since, owing to the advances which have been made in the subject during recent years, it has been necessary to practically rewrite the whole of it, and add a vast quantity of new facts and discoveries; but still, even in the present edition, which has been again largely altered and rewritten, Parkes' original arrangement and methods of dealing with the various subjects discussed has continued to be followed, and constantly recalls the older book.

The reason for the success of the volume in its present form is not far to seek. In the first place, there is no book of its size which deals in such a comprehensive manner and affords so much practical information on the many important subjects embraced by the term hygiene; and, secondly, its information is accurate, reliable, and brought well up to date.

In fact, notwithstanding the large number of published works on hygiene, we know of none which, if we were to be restricted to the purchase of a single volume, forms a more valuable and complete *vaide mecum* for a health officer. This is a distinct advantage to those who are engaged in the practice of their profession in countries where special

literature and monographs are not available for consultation; and the chapters dealing with military and marine hygiene, parasitic and infective diseases, render it especially valuable in this respect. It is unnecessary to refer in detail to the subjects dealt with in a book so well known; and, indeed, taking into consideration the scope of the work and the necessary limitations of space accorded to various subjects, it is difficult to find grounds for criticism of an adverse nature. We think, however, that the chapter dealing with drainage might well be improved upon, and the principles of house drainage be more clearly laid down.

A chapter summarising the precautionary measures advisable in dealing with outbreaks or threatened epidemics of disease would be of great practical value, even if it consisted merely of the memorandum published by the Local Government Board, although this might easily be extended and improved upon, with special reference to diseases more commonly prevalent in tropical regions.

In connection with this subject, we note that the authors are sceptical as to the practicability of the quarantining of persons who have been exposed to infection in the large towns of this country. Such a measure is frequently employed in some towns in the case of smallpox or typhus fever outbreaks, with the same success which has attended its adoption in the recent plague outbreak in Glasgow.

The plates and diagrams with which the volume is illustrated are, as a rule, excellent, if Plate VI., depicting the hind-quarters of a cow, bull, and ox, be excepted. It is difficult to understand the reason for the inclusion of a plate which shows so little and that indifferently well.

The text is remarkably free from errata; but we have noticed "Sellar" in place of "Sillar" on page 568, while on page 682, in referring to the death-rate from puerperal fever, the year 1896 is evidently a misprint.

HARVEY LITTLEJOHN.

Der Pemphigus und die essentielle Schrumpfung der Bindehaut des Auges: Eine klinisch-kritische Studie. Von Dr. F. FRANKE, Augenarzt in Hamburg. Wiesbaden: J. F. Bergmann. 1900.

THERE is a peculiar and, fortunately, rare disease of the mucous membranes of the eye, characterised by a gradual adhesion of the palpebral and ocular conjunctivæ, leading to a narrowing of the aperture of the eyelids, inversion of the eyelashes, exposure of and ulceration of the cornea, and finally shrinking of the ball with loss of sight, of which 102 instances have been collected and tabulated by Franke. He has subjected these to a rigorous analysis, and compared their features with those of five unpublished examples which have come under his own observation. The nature of the complaint is still undetermined, for though in a fairly large proportion bullæ were seen at some period on the general integumentary surface, or in the mouth, or on the pharynx, coincidentally with the formation of vesicles on the eyes, still this was not invariable, and an absolute connection with ordinary pemphigus has not been quite proved. Morris's case, perhaps, supports the view of their association most conclusively, as in his there was not only this shrinking of the structures of the eye, but on many parts of the body definite

scar tissue developed as a sequela of blebs. The condition as regards the eyes is probably in all cases a progressive one, though there may be times of apparent quiescence, followed by recrudescence and further advance. All treatment, so far, has been unavailing to cause arrest of the morbid process; even palliation is limited. The work is an example of the thoroughness with which such questions are threshed out in Germany, but in this instance it is permissible to doubt if the result of the inquiry repays the labour expended. The treatise is, however, valuable from a referential point of view.

W. ALLAN JAMIESON.

Therapeutisches Vademecum der Haut und Geschlechtskrankheiten für praktische Aerzte. Von Dr. REINHOLD LEDERMANN, Spezialarzt für Hautkrankheiten in Berlin. Zweite durchgesehene und erweiterte Auflage. Berlin: O. Coblentz. 1901.

WE expressed a favourable opinion of this compendium when it first appeared in 1898, and this second edition is in various respects an improvement. It has been reduced to a much more handy size, if it is really to be a *vade mecum*, and in its revision it has been thoroughly brought up to date by the inclusion of new remedies. It opens with a terse, but in the main sufficient account of the means at our disposal for the treatment of skin diseases. The internal are soon disposed of, but the list of the external is very complete. Useful formulæ for baths are furnished, selected salves of many kinds are provided for choice, the newly introduced excipients find a place, liniments—by which name varnishes more properly are meant—figure conspicuously, while plaster and salve muslins, paste and salve pencils, soaps and saponaceous applications, are all duly described. Following this is a special part wherein the remedies in use are arranged alphabetically, the mode of employing each explained, and the most approved prescriptions for their exhibition given in full. Then follows a list of the more important cutaneous diseases, with a sketch of the treatment appropriate to the stages. The methods recommended are those which have stood the test of time, and much care has evidently been expended in judicious gleanings. Brevity has been studied, yet the directions are clear. One-third of the volume is occupied with the management of venereal disorders, and here also the advice offered is plainly the outcome of extensive practice, and the advantage, or the reverse, of various methods well laid down. The book is really what its author designates it, and it will be found a suggestive guide to the proper treatment of the ailments with which it deals.

W. ALLAN JAMIESON.

Vademecum für Histopathologische Untersuchungen in der Gynäkologie. By Dr. E. G. ORTHMANN. Berlin: S. Karger. 1900.

THIS little work supplies a real want in a very satisfactory manner. There are many young gynæcologists who would willingly work up the histopathology of their own clinical material were it not for the difficulty of making a beginning, and Dr. Orthmann's book should stimulate and help them to overcome the initial trouble. In the first twenty pages

the author describes simple but perfectly good methods of making preparations. This chapter is much less formidable than an ordinary textbook of histological technique, but is quite sufficient for its purposes. The rest of the book consists of short clear descriptions of the microscopical appearances of the tissues and new growths which are met with in gynæcological work. These descriptions are illustrated by clear and well-executed drawings of well-chosen sections. Given a microscope, a small microtome, and half-a-dozen reagents, any one who has access to the specimens obtained in a gynæcological operating room could, with no help beyond this little book, acquire a very complete knowledge of the histopathology of the diseases of women.

W. E. FOTHERGILL.

Gynæcological Operations, exclusive of those interfering with the Peritoneal Cavity. By SKENE KEITH, M.B., F.R.C.S.Ed. Edinburgh and London: Young J. Pentland. 1900.

IN this little book an attempt has been made to enter fully into what has to be done, from the time any minor gynæcological operation has been decided on, until the patient has been discharged. The introductory chapter contains much sound common sense about the use of antiseptics in vaginal work. The author condemns shaving the pubes before operations as a routine practice, on the ground that it is disagreeable and unnecessary; he also deprecates fussy and futile attempts to sterilise the vagina. He has "no belief in a nailbrush for the hands," holding that, "if any one really requires to wash his hands for fifteen minutes before operating, he must be doing at other times some kind of work which he had better leave alone." In a chapter on methods, instruments, and appliances, the value of a light hand is insisted upon, and simplicity in the matter of instruments is urged. The author considers a skilled assistant and a nurse, as well as an anæsthetist, to be necessary in many operations which are frequently successfully performed with the assistance of an anæsthetist, a "neighbour," a Clover's crutch, and a weighted speculum. The descriptions of operations are clear and simple. Only one method of performing each has been described, but, as a rule, a very good method has been chosen. In dealing with complete and incomplete tears of the perineum, it is interesting to note that the author prefers to remove the mucosa from the torn surfaces, and condemns the so-called flap-splitting operation of Tait, on the ground that the perineum made by this method is not so satisfactory as that secured by the older operation. The advantage of the book is that it gives clear and precise directions as to one method of performing each operation, without troubling the reader with the names of authorities and the differences between their routines. Being of a robust and dogmatic type, this work will doubtless prove valuable to many who have neither time nor patience to select methods for themselves amongst the mass of instructions given in the current literature of gynæcological technique.

W. E. FOTHERGILL.

Practical Gynæcology. By E. E. MONTGOMERY, M.D., Professor of Gynæcology, Jefferson Medical College. London: Rebman, Ltd.

DR. MONTGOMERY is to be heartily congratulated on the production of this volume. Unlike many of the treatises on this subject, it represents a compilation of facts acquired through a matured experience, by which means the author is enabled to discriminate with considerable weight between the many methods of treatment recommended by individual workers and writers.

It is refreshing to note the conservative spirit in which treatment is laid before the reader; the radical modern surgical methods, though fully and ably described, are not made to swamp the less heroic but equally beneficial methods of procedure. Thus the electrical treatment of fibromyomata of the uterus is discussed in as full a manner as the various operations of myomectomy and hysterectomy. The palliative measures for treating cases of inoperable cancer are perhaps more fully laid down than in any other text-book. That this is as it should be, is evident when we consider the vast proportion of such cases which come under the care of the gynæcologist. At the same time, the most radical operative measures for the removal of the disease are described in great detail.

The sectional method employed in the classification of the subject in general, appears more involved than the time-honoured mode of discussing the diseases of the individual organs, and must be confusing from a reference aspect. Each subject, however, is treated in a masterly fashion, the clinical features, diagnosis, and treatment are lucidly explained, and bear the stamp of conversance with the rapid advances which are at present associated with this branch of medicine. The designation of the work as a "Practical Gynæcology" by no means represents its true character, which, though eminently practical, is at the same time a complete text-book on the subject.

The chapter on extra-uterine gestation is extremely full, but too little stress seems to be laid on the symptoms of intraperitoneal hæmorrhage being so often due to the escape of blood from the separating ovum through the patent abdominal ostium of the Fallopian tube, and thus simulating actual rupture. Complete closure of the abdominal ostium after the eighth week is not in accordance with practical experience. The pathology of deciduoma malignum, and fibrocyysts of the uterus, are somewhat scantily described, and deserve more attention.

The illustrations are quite a feature, being in great profusion, and admirably chosen. In this connection it seems a pity that more microphotography instead of diagrammatic representations of microscopic appearances had not been used. As a whole, the illustrations show a distinct advance to any we have seen in a similar text-book, and the work may be considered as in the very forefront of recent publications, and will certainly have a ready acceptance as a reference work of much value, which must reflect great credit on its author, who again may be heartily congratulated on its production.

F. W. N. HAULTAIN.

A Manual of Medicine. Edited by W. H. ALLCHIN, M.D. (Lond.) F.R.C.P. Vol. II. "General Diseases"—continued. London: Macmillan & Co. Ltd.

THE second volume of the Manual opens with an account by Drs. Shore and Cantlie of the forms of disease caused by parasites, which the authors treat with as much fulness as forty-one pages of space will permit of. The illustrations are good; it may perhaps be regretted that a representation of the proglottides of *Tenia saginata* is not given for the purpose of comparison with *T. solium*. The former is more common than is supposed, and is not unfrequently mistaken for *T. solium*. An article by Dr. Vivian Poore and the Editor follows on diseases determined by poisons introduced into the body as such. The formation and the poisonous effects of the animal alkaloids are described.

After reference to ergotism, pellagra, and lathyrism, to excess in alcohol and opium, and to the newly invented vice of cocaineism, the authors take up in order the several metallic poisons. The too frequent presence in England of arsenic in that obscure chemical compound by an euphemism termed *beer* had not been discovered when this article was written, but it might perhaps, for diagnostic and preventive reasons, have been well to mention the poisonous amount of arsenic present in some of the weed destroyers which are so largely used in country districts.

The authors mention the contamination of beer with lead from the pipe connecting the beer-pump with the cask in public-houses, a cause of poisoning of which few people are aware. The reviewer has definitely traced severe cases of plumbism to this source. The authors refer with justice to the lowered vitality (a form of slow poisoning), which is so commonly due to lack of ventilation in dwelling-houses, and in this connection it is perhaps a matter of surprise that no note is made of the perils of "water gas," which unfortunately is now being distributed by so many Companies to the houses of an unsuspecting public, who are seldom aware of the perils to life and health apt to result from an escape of carbon monoxide.

The subjects of the autogenetic poisons, and of the progressive and retrogressive changes occurring in the body, which the editor treats with much ability, are all interesting, so also is that of inflammation dealt with by Dr. Lazarus Barlow—perhaps only less so than the editor's article on malignant disease. Here the burning questions of cause and origin are discussed.

The evidence in favour of the microbic hypothesis, also that dealing with the causation of the disease in animals by the introduction of blastomycetes from human carcinoma, are described, reference being made to Sanfelice's experiments, and to the article by Drs. Bellingham Smith and Washbourn in this Journal, in January 1890.

Prof. J. R. Bradford follows with an account of the physiology and pathology of the ductless glands, clear, concise, and full of interest. The editor's article on obesity, those by Dr. Bertrand Dawson on diabetes mellitus and insipidus, also that on gout by Dr. Luff, would claim attention if space permitted. After a succession of brief articles on such subjects as rickets, acromegaly, gigantism, etc., the volume is

completed by papers on the normal and pathological conditions of the blood, on chlorosis, scurvy, and purpura.

This second instalment of the Manual is full of interest and in no way declines from the standard of excellence attained by its predecessor.

RICHARD CATON.

Handbook of the Diseases of the Eye. By HENRY R. SWANZY, F.R.C.S.I.
Seventh Edition. London: H. K. Lewis. 1900.

AMONG all the text-books on the subject of "Diseases of the Eye" (and their name is legion), there are few which, in our judgment, have so much to commend them as has that of Mr. Swanzy. The new edition is a still further improvement on its predecessor, in that it contains some matter required by the recent advances of ophthalmic practice, notably the application, according to Mackenzie Davidson's method, of the Röntgen rays to the diagnosis and localisation of foreign bodies in the globe. The handbook is to be commended for its simplicity and its clearness, for its learning and yet its clinical definiteness, for its completeness, and yet its avoidance of unnecessary verbiage. It is not so short but what a student who has made himself master of it will meet with few conditions in which it does not act as a safe guide, while at the same time it is not so long that a doctor in general practice cannot overtake the reading and digestion of it. Indeed, it is in some ways one of the most valuable of such text-books for the general practitioner, giving a prominent place as it does to the importance of eye symptoms in spinal, cerebral, and other diseases, and to the relation of diseases of the eye to those of the system more generally. We can cordially recommend it.

W. G. SYM.

A Manual of Surgery for Students and Practitioners. By WILLIAM ROSE, M.B., B.S. (Lond.), F.R.C.S.; and ALBERT CARLESS, M.S. (Lond.), F.R.C.S. Third Edition. London: Baillière, Tindall & Cox. 1900.

As this work has reached its third edition within little more than two years of its publication, there can be no doubt that it meets the requirements of those to whom it is addressed. We have already expressed our own appreciation of its value, and have only to add that the edition before us serves to confirm the high opinion we had previously formed. By the rearrangement of certain chapters, so as to bring those relating to injuries of tissues and organs into juxtaposition with those describing their diseases, the student will obtain a more satisfactory idea of the subject-matter than was possible under the previous arrangement. The other alterations which have been made have, fortunately, not entailed any addition to the size of the volume.

A well-selected set of skiagraphic plates has been added, and the other new plates and blocks are in the direction of improving the illustration of the work, which, however, still leaves something to be desired.

ALEXANDER MILES.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

A. LOCKHART GILLESPIE, M.D., F.R.C.P.Ed.,

MEDICAL REGISTRAR, EDINBURGH ROYAL INFIRMARY.

URIC ACID.

THE January number of the *International Medical Magazine* is chiefly devoted to the vexed question of uric acid and its congeners; their origin, elaboration, misdeeds, and the best methods for combating their ill effects. Croftan, Tyson, von Noorden, Billings, Montgomery, Hirst, and Haig contribute to the discussion, in addition to the editorial staff.

Croftan regards the alloxuric bases, closely allied chemically to uric acid, as the true causes of lithæmia and the uratic dyscrasia; uric acid only acting pathologically in these conditions, from its tendency to form concretions. Both uric acid and alloxuric bases are products of nuclein disintegration, mainly derived from the nuclei of white blood corpuscles; while it entirely depends upon the activity of oxygenation in the organism whether non-toxic uric acid results, or if this activity be insufficient, to poisonous bases.

Von Noorden accepts as sufficiently well established Horbaczewsky's general proposition, that uric acid and xanthin bases are products of the decomposition of nuclein or nucleinic acid at different stages of oxidation. Whether all the nitrogen in these bodies leaves the body in the form of purin bases (uric acid and xanthin series) is still doubtful, or if part of it is not expelled as urea. Again, it cannot be definitely stated whether the nuclein compounds constitute the sole fount of the purin bases excreted in the urine, or if they are assisted from other sources. It is not improbable that uric acid *per se* is non-toxic.

Frank Billings, who does not belie his prenomens, emphatically expresses his belief in the origin of these bodies from nucleins, and in the slight toxic properties possessed by uric acid, which in fact are limited to the local effects of deposit of sodium salts of the acid.

Haig merely reiterates the views he has so fully elaborated in his work on uric acid, by for the most part, indeed, simply referring to passages in his latest edition to explain his position. He refuses to ascribe any real importance to the uric acid manufactured in the body

in the causation of disease; if not reinforced by introduction of uric acid and xanthin bases in the food, the quantity personally produced in the tissues can always be safely disposed of; if, however, uric acid or other cognate substances be present in the articles of diet taken, and in considerable amount, accumulation in the tissues of some such bodies will inevitably follow.

The work of Burian and Schur (*Arch. f. d. ges. Physiol.*, Leipzig, 1900, Bd. lxxx. S. 241), although it might more properly be considered under Physiology, has such a direct bearing upon this subject, that allusion to it here may be pardoned. These observers distinguish between purin bodies of endogenous and of exogenous origin, as they occur in the urine; the first formed in the body, the second derived from preformed purins present in the food consumed. The daily quantity of the endogenous purin bases excreted in the urine is apparently a constant for each individual, and does not diminish on a purin-free diet,—such as pure fats and carbohydrates, bread, potatoes, rice, milk, cheese, and eggs. On the other hand, a diet rich in purin bodies—a meat diet—causes variation in the quantity of uric acid and allied bases excreted, proportionate to the amounts introduced in the food, but not equal to them, as a moiety undergoes destruction in the body. The exogenous purins do not seem to have any definite connection with the actual ingestion of pure native proteids, for they show no increase in amount excreted on a purin-free diet, however much vegetable albumin be present in it.

The results of Burian and Schur give some support to Haig's hypothesis, as far as the source of members of the uric acid series is concerned.

GOUT.

STRUMPELL (*München. med. Wchnschr.*, September 18, 1900) understood more than twenty years ago, when at Leipzig under Wunderlich, that gout was common enough in England but very rare in Germany. In 1880, however, Cohnheim and Weigert demonstrated that "gouty kidney" was not so uncommon in the land. In each post-mortem examination in which deposits of uric acid were found in the kidneys, the metacarpal-phalangeal joint of the big toe was opened, and often enough uratic deposits discovered in them. His own experience in Erlangen during the last fourteen years has led him to conclude that, in Bavaria, gout is of fairly frequent incidence; and he hears that it has lately increased in Leipzig. He refuses to believe that these facts rest upon any sounder basis than the better knowledge of, and ability to diagnose, the condition on the part of the German physicians; the cases now regarded as of gouty origin having formerly been placed under some other category.

The multitude of different forms in which gout may be manifested calls for the greatest attention on the part of the physician. Even he who has only read or heard of the typical acute attack in the big toe can have no difficulty in recognising its nature on first acquaintance. But when other joints form the seat of inflammation, it not unfrequently happens that the possibility of gout being the primary cause is overlooked, in favour especially of rheumatic affections. Partly by proper appreciation of the local symptoms and signs, partly (and more profitably)

by careful investigation of the clinical, personal, and family history, the true character of the lesion may be established. In very few diseases is the diagnostic value of a correct history of the case so great as in gout. Strümpell proceeds to take up in this connection a number of particular points—(1) In most cases, gout, to begin with, displays an affectionate liking for the basal joint of the big toe; this affectionate regard may endure through many successive onsets, but frequently gout will be “off with the old love, and on with the new,” by involving during future attacks distant joints. Thus, when a joint other than the big toe is affected pathologically, inquiry should be made as to whether any previous inflammatory attack of the big toe joint has been experienced. Now and then the latter joint escapes in the earlier occasions, more rarely throughout. (2) In gout the lower limbs suffer more than the upper; the distal joints more than the proximal; the shoulder and hip-joints are rarely involved, even in pronounced chronic articular gout, differing markedly in this respect from rheumatic polyarthritic affections. (3) Gout is usually mono- or oligo-articular; if more than one joint be attacked, it is generally those corresponding to each other on opposite sides of the body, or two adjacent joints of one limb. (4) Attacks of gout in the same individual recur more frequently than of acute rheumatism. Whenever attacks, thought to be due to acute rheumatism, recur unusually often, think of gout. (5) The duration of gouty paroxysms is shorter than in acute rheumatic attacks; lasting from three to four days in mild, eight to ten days in severer cases. (6) As to the actual symptoms associated with an acute attack, Sydenham’s classical description of the feeling of well-being and good appetite does not seem to hold good. Most of the sufferers complain of diminished appetite, nausea, indigestion, and a few of emesis. Pyrexia frequently obtains, but seldom in any great degree. Notwithstanding the many recent researches into the relationship of uric acid excreted in the urine to gouty attacks, the subject is still far from clear. For ordinary practitioners diagnosis of gouty conditions is not concerned with urinary chemistry, nor with the intimate composition of the blood.

Turning to latent gout, he states—(1) It appears at first sight that there is scarcely any difference between the signs and symptoms displayed by chronic gouty arthritis and those of arthritis deformans. But the victims of the former disease usually afford evidence of earlier acute gouty attacks, in the form of cicatrices over toes and fingers, where uratic nodes have been emptied; the joints of the little finger are generally more firmly ankylosed, the fingers as a whole less uniformly disturbed; often nodes may be found in the ears; and, of more importance, a history of several acute arthritic attacks in earlier life will serve to indicate the true nature of the disease. (2) An important form of latent gout is presented by cases characterised only by subjective symptoms, especially in the lower limbs, such as the various “algias.” (Among gouty lesions of internal organs those of the kidneys are of some importance.) The true nature of the affection can seldom be ascertained by clinical examination alone; anamnesis is more often of use. (4) The condition of the heart and arteries carries weight. The results of arterio-sclerosis generally occur unusually early in the gouty; but how far these are due to abnormal metabolic processes, or how far they are the sequel of

alcoholism and free living, is a doubtful matter. In many, the arterio-sclerotic changes and the gouty attacks appear to depend on one and the same primary error; in others, the arterial lesions seem to arise directly upon contact with the abnormally altered blood supply during gouty paroxysms. (5) The relationship between gout and metabolic anomalies is still a mystery. Incomplete combustion of carbohydrates gives rise to glycosuria; abnormal disintegration of proteids to gout; deficient combustion of fat to constitutional obesity. These three abnormalities are closely related with one another, and usually depend upon some constitutional taint.

SURGERY.

UNDER THE CHARGE OF
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PRUS' METHOD OF RESUSCITATION IN CASES OF DEATH UNDER CHLOROFORM.

IN a series of experiments performed on dogs, Prus of Lemberg observed that after killing the animal by means of chloroform, electricity, or asphyxia, he was able to resuscitate a considerable proportion by blowing air into the lungs through a tube in the trachea and by direct rhythmic compression of the heart.

This method has been treated in practice by Maag of Nästved (Denmark) in the following case, which presents many features of interest:—

A labourer, æt. 27, was admitted into hospital in order to have the sciatic nerve stretched for inveterate neuralgia. The internal organs were healthy, and although formerly intemperate, he had given up the use of alcohol for several years. The operation was arranged for 8 A.M., and chloroform was given drop by drop on a mask; after ten minutes, the patient was sufficiently under to be turned on the side. After the usual preparations, the incision was made, but, as he reacted vigorously, the anæsthetist was requested to give more chloroform; he then became cyanosed from arrested respiration, but was easily brought round by the usual methods. The operation was then satisfactorily completed. He again became asphyxiated without any more chloroform having been given, and it was found impossible to restore animation by the usual methods. After persevering with these for ten minutes without avail, tracheotomy was performed and air was blown into the lungs through a rubber tube fitted into the cannula. The patient still remained cold, cyanotic, and pulseless; it was therefore decided to have recourse to direct rhythmic compression of the heart. A flap of the chest-wall including the third and fourth costal cartilages was raised and turned back, the left pleural cavity being unfortunately opened into; the hand was inserted into the thorax so as to grasp the heart enveloped by pericardium. The heart was found to be quite motionless, but after a few rhythmic compressions,

it began to beat, at first feebly, and then more and more strongly. The compression of the heart was effected partly by grasping it and partly by pressing it against the posterior aspect of the sternum. The blowing of air into the trachea was continued, but half an hour elapsed before the first spontaneous inspiration, and another half hour before the breathing became deep and regular; by this time the heart was beating strongly, at the rate of about 70 per minute, being only compressed occasionally; the vessels in the chest wall began to bleed so as to necessitate their being ligatured; the patient's colour became natural, the pupils contracted, and the jaws clenched. The wounds were stitched, except where a strand of gauze was placed in the left pleural cavity, and the patient was sent back to bed.

Except that he remained insensible and did not react when the sutures were inserted, it appeared as if the immediate danger had been overcome; at twelve o'clock, however, the respiration began to fail, and in the course of a few minutes stopped altogether, in spite of every effort to restore animation. The blowing of air into the trachea was continued, the heart went on beating regularly, the patient looked as if he were sleeping, with a good colour and contracted pupils, until eight in the evening, when the heart stopped; he at once became like a corpse, and the temperature fell to 94° F.

The sectio was made twenty hours after death; the heart and aorta were healthy; there were subpleural ecchymoses in both lungs; the diaphragm was displaced upwards by accumulation of air in the stomach and intestines.

In his remarks on the above case, the author believes the patient was truly resuscitated by Prus' method, and that his permanent recovery was only prevented by accidental circumstances. For one thing, it would appear to be essential that, in blowing air into the lungs, a tightly fitting tracheal tube should be employed, which will prevent the air from escaping upwards and passing into the stomach and intestines, as otherwise the diaphragm is incapable of continuing its functions. The blowing, by the mouth, of air, which has already been respired, might be replaced with advantage by a cycle or other form of air-pump. Finally, in opening the thorax in order to exert compression of the heart, it is desirable to avoid opening the left pleural cavity.—*Centralbl. f. Chir.*, Leipzig, Jan. 5, 1901.

TREATMENT OF RECENT DISLOCATION OF THE PERONEAL TENDONS.

REERINK of Freiburg records the case of an officer, who, in mounting his horse, with the left foot in the stirrup and pushing off with the right, the left foot slipped, so that the whole weight of his body rested for a moment on the left foot while it was twisted inwards. In attempting to retain his hold in the stirrup, a snapping sound was heard audible to the bystanders, with such violent pain that he was obliged to let himself sink to the ground. On examination, there was great swelling around the ankle, and the peronei tendons were found lying in front of and over the external malleolus; the toes were pointed, and movements at the ankle were very painful. When the swelling had subsided, the tendons were replaced behind the malleolus and retained in position by a series

of strips of plaster, at right angles to the long axis of the tendons, and over them a well-padded case of plaster of Paris. Fourteen days later, the case was removed, and as the tendons were satisfactorily in position, another case was applied and worn for three weeks. Subsequent treatment by massage and exercises enabled the patient to return to military duty three months after the accident. In a similar case, in future, the author would omit the plaster of Paris as being unnecessary.—*Centralbl. f. Chir.*, Leipzig, Jan. 12, 1901.

AN IMPROVED METHOD OF DIVIDING THE TENDO ACHILLIS.

BAYER of Prague, who formerly recommended the open division of the tendo Achillis, has modified his method as follows:—One half of the tendon is divided subcutaneously close to the muscle on one side, while the other half is divided below close to the os calcis, on the opposite side; as the equinus attitude is corrected, the tendon readily stretches out to the desired extent. The cutting is carried out from behind forwards by means of a narrow tenotome. In an illustrative case, the patient was able to put the sole of the foot to the ground and walk, sixteen days after the operation.—*Centralbl. f. Chir.*, Leipzig, Jan. 12, 1901.

THE VALUE OF SURGICAL INTERFERENCE IN TUBERCULOSIS OF THE BLADDER.

SAXTORPH of Copenhagen presented a report on this subject to the International Congress in Paris. Vesical tuberculosis nearly always originates from a tuberculous lesion of the lung, usually one of long standing. The infection of the bladder may be a descending one, in which case the bacilli are carried in the blood stream to the kidney, from which they are carried down to the bladder and deposited in the mucous membrane. Or the infection is an ascending one, the bacilli being carried by the blood stream to the prostate, seminal vesicles, testicle or epididymis, from which the infection spreads by direct contiguity to the wall of the bladder, finally reaching the mucous membrane. The bladder is fairly resistant against tuberculous infection, and is practically never the seat of a primary infection from the blood.

Being therefore always a secondary disease, vesical tuberculosis can never be said to have been treated radically, unless the source of the infection is also removed, whether by operations directed to the kidney and ureter, or to the genital organs. When these are not feasible or impracticable, it is useless to carry out any radical treatment of the vesical tuberculosis. On the other hand, if the cause of the disease in the bladder has been removed, or has become arrested, then the bladder trouble may either cure of itself, if not taken deep root or of long standing, or be made the object of surgical interference. This is carried out by means of a suprapubic cystotomy; the diseased tissue in the mucous membrane is removed by the knife, scissors, or spoon, followed by the vigorous use of the thermo-cautery. The patient should occupy the Trendelenburg position, and the interior of the bladder should be under the eye of the operator throughout. When the source of the bladder

infection cannot be removed, treatment is only palliative, and is directed towards relief of the two chief symptoms—pain and frequency of micturition. This may be accomplished by suprapubic or perineal drainage, curetting the mucous membrane by the urethra in the case of women, and local applications to the bladder; these must be very dilute, and introduced in small quantities, and are chiefly for the purpose of removing the urine or pus, which tends to remain in the bladder. The various drugs which have been specially recommended are of no real value. Boracic acid is the best and simplest. Nitrate of silver is contra-indicated. Hygienic and dietetic treatment is an essential addition during the whole course of the disease.—*Ann. d. mal. d. org. génito-urin.*, Paris, August 1900.

LUNG COMPLICATIONS AFTER OPERATIONS.

GERULANOS discusses this subject, the importance of which is evidenced by the fact that out of ninety-five deaths after operation during the last year in the clinique at Kiel, no less than eighteen were associated with an affection of the lungs. With regard to the anæsthetic employed, the author is inclined to blame ether for its well-known effect in exciting abnormal secretion of mucus in the mouth, throat, and air passages, and also for the irritating effect of its vapour on the lungs themselves, and for its indirect effects in weakening the heart, soft palate, and larynx. The aspiration of mouth secretion may assist in the causation of bronchitis and of pneumonia. The conditions are similar under chloroform anæsthesia, without, however, the excessive secretion of mucus. Lung complications may also follow upon operations performed under local anæsthesia, being then hypostatic in character.

The different forms of pneumonia and gangrene of the lung resulting from the inhalation of vomited matter or other septic material are well known. Another group of lung complications are of embolic origin, being especially met with after operations in the abdomen and on the head. The direct invasion of bacteria through the lymphatic circulation in the diaphragm may be responsible for the pneumonia in the lower lobes of the lung after operations on the liver and gall bladder and for perforated gastric ulcer.

The author regards the exposure and cooling of the patient during major operations as a predisposing factor in the production of lung complications.

Regarding the prevention and treatment of pulmonary affections following upon operations, the following suggestions are offered:—Anæsthetics should be given sparingly, and chloroform should be preferred to ether. The mouth and teeth should be cleansed beforehand, and, in the case of abdominal operations, the stomach may be washed out. Where there is abundant secretion of mucus, the head should be dependent. Where there is a tendency to hypostasis after operation, the patient should be encouraged to breathe deeply, and his attitude in bed changed from time to time. Constricting bandages round the chest or abdomen may be replaced with advantage by strips of plaster. Exposure and cooling of the patient should be reduced to a minimum.—*Centralbl. f. Chir.*, Leipzig, January 19, 1901.

RADICAL OPERATION FOR CURVATURE OF THE PENIS.

EUGENE FULLER records the case of a young man, æt. 20, who had contracted a severe attack of gonorrhœa eight years before. Two years later, stricture of the anterior urethra having formed, internal urethrotomy was performed by an eminent specialist. The operation was followed by considerable inflammation, and the formation of a dense mass of cicatricial tissue in the corpus spongiosum, with the result that the penis was curved downwards when in a state of erection. When felt from the outside, the entire anterior urethra appeared as a hard unyielding mass. On erection, the thickened urethra stood out prominently, like the cord to a bow. In the middle penile portion, there was an especially thick node, marking the site of the chief stricture and the spot where the deepest cutting had been done in connection with the previous internal urethrotomy. It also appeared as if some of the shortening were due to an arrest in the development of the urethra and corpus spongiosum, probably due to the effects of inflammation and urethrotomy on a young growing subject. The author undertook to attempt to remedy the deformity, provided he was held blameless in case of failure, not only to cure the defect, but also should the operation leave the patient in a condition more unsatisfactory than before.

The procedure proposed was to cut through the urethra and the surrounding unyielding tissues, and then to cause a separation of the ends sufficient to make up for the urethral shortening, the space between the ends being left to fill in by granulation as in extensive resections of the urethra. The author was afraid to resect the penile urethra anterior to the scrotum lest a fistula should persist.

The perineum was accordingly laid open from just above the rectum up and on to the uplifted scrotum. The urethra was then cut across very obliquely in the bulbous region. The penile end, in order to facilitate its retraction, was dissected free from the surrounding tissues for about $\frac{3}{4}$ in., after which the penis was pulled up and bent back over the pubes. In this position, the maximum amount of separation of the cut ends of the urethra occurred. Then, while maintaining the penis in the above position, the penile end of the urethral roof was stitched with fine catgut to the surrounding tissues, while a longitudinal incision, half an inch in length, was made along its floor. The roof of the posterior end did not require to be stitched, as it had not been freed by dissection from the surrounding tissues. A perineal vesical drainage tube was then inserted, and the perineal wound closed by suture. The penis was left, bent back over the pubes, and secured by transverse strips of plaster. The wound healed well, and the operation was a distinct success.

Two years later, the patient urinates with a free stream, and his penis is nearly straight during erection. The sexual act is accomplished without difficulty.—*Ann. Surg.*, Phila., June 1900.

OBSTETRICS AND GYNÆCOLOGY.

 UNDER THE CHARGE OF

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 ATTENTION FOR THREE HUNDRED AND FORTY-FOUR DAYS OF A FŒTUS
DYING AT FULL TIME IN A NORMAL UTERUS.

KREKET (*Arch. f. Gynæk*, Berlin, Bd. lxi. Heft 2) reports the following case:—

P., primipara, æt. 26, pains began at what was regarded as full time; foetal movement ceased soon after onset of labour. Sixty-four days later, *i.e.* about the three hundred and forty-fourth day of pregnancy, the child was delivered with forceps. The macerated foetus showed no abnormality. The case resembles one published by Kelly, where the membranes remained unruptured till the date of delivery. Krevet refers to the rarity of retention of a foetus after full time, as contrasted with the frequency of missed abortion. The cause of the retention is unknown, and although Krevet believes that the onset of labour and death of the foetus are probably caused by some change in the latter during the later months of pregnancy, yet in this case there was no ascertainable disease of mother, foetus, or uterus. Krevet points out the importance of waiting for spontaneous delivery in cases of retained foetus with membranes unruptured, the possibility of pregnancy in a rudimentary horn being excluded. With the membranes ruptured, the uterus must be emptied without delay, and if the foetus be infected to any extent, the uterus must be extirpated at the same time.

 THE RESULTS OF THE OPERATIVE TREATMENT OF CARCINOMA
OF THE UTERUS.

WALDSTEIN (*Arch. f. Gynæk*, Berlin, Bd. lxi. Heft 1) reports all the cases operated on by Schauta of Vienna up to January 1899. In all there were 274 radical operations, divided as follows:—

241 vaginal hysterectomies.	
15 abdominal	„
16 sacral	„
2 perineal	„

The direct operative mortality = 12·4 per cent., or, excluding complicated cases, = 9·9 per cent. From a study of the temperature before and after operation, Waldstein concludes that such cases are specially liable to die from septic infection. As many cases, however, are infected before operation, the occurrence of sepsis cannot be attributed entirely to the operation, and this accounts for a mortality of 12 per cent. in cases of carcinoma, as compared with 3 per cent. for ovariectomy.

In considering the permanent results, those must vary according to whether the disease is limited to the uterus, or has, at the time of operation, extended to surrounding parts. Of the former 57 per cent., and of the latter 87 per cent., died within six years. If one takes, as a basis for comparison, cases of cancer of the uterus not treated by operation, Waldstein believes that, in early cases, operative treatment prolongs life in 64 per cent.; in more advanced cases this may be expected in about 40 per cent.

COMPLETE PRIMARY AMPUTATION OF THE UMBILICAL CORD.

R. L. DICKINSON (*Brit. Med. Journ.*, London, September 1900) pleads for a more scientific method of treating the umbilical cord at birth. The present plan of distal ligature, followed by separation of the stump by a process of dry gangrene, is hard to reconcile with modern antiseptic principles. A large proportion of the mortality in the early weeks of infant life has been proved from the statistics of lying-in hospitals, and foundling institutions, to be due to navel infection. At the Innsbruck Maternity Hospital, sixteen out of eighty-one autopsies on infants proved that death was due to umbilical sepsis; arteritis, phlebitis, suppuration, erysipelas, pyæmia, and similar conditions being noted as common causes. The author advocates amputation of the stump at birth, and dry dressing of the resulting skin wound. The vessels of the cord are ligatured with silk or catgut, and divided, when they immediately retract. The flap of skin is then turned in, and a dry dressing applied. The wound at the navel should be healed within a week.

MALIGNANT HYDATID MOLE.

SOLOWY and KRZYSZKOWSKY, Lemberg (*Monatschr. f. Geburtsh. u. Gynæk.*, Berlin, Bd. xii. S. 15) record the following case:—

The patient, æt. 47, the mother of ten children, the youngest being 5 years old, was admitted to hospital, suffering from a suspected malignant tumour of the uterus. She had been in good health, and menstruated regularly until about ten weeks previous to admission, when she was attacked by considerable and continuous hæmorrhage with abdominal and sacral pain. Labour pains followed, and a hydatid mole presented through the dilated os. On cleaning out the mole, it was found that the villi had grown through the uterine wall and had extended into the connective tissue of the pelvis. The patient succumbed, the result of sepsis and persistent hæmorrhage, and at the autopsy, the villi were found to have invaded the right ovarian artery, and the new growth had from thence undergone further development. Illustrations of the macro- and microscopic appearances accompany the article. The case led Solowy to suggest that in every case where an hydatid mole had existed beyond the first half of the term of pregnancy, the uterus should be cleared out and then extirpated by the vaginal route as a precautionary measure.

According to Vander Hoeven (*Weekblad*, No. 8), the syncytium of the chorionic villi comes from the foetal ectoderm, Langhans' cells from the somato-pleura. In a mole, either or both tissues may undergo

proliferation, reminding one of the growth of malignant tumours. It depends upon the behaviour of the two whether the result becomes a synecyrium, or a deciduoma, or a mixed form.

THE RELATION BETWEEN DYSMENORRHOEA AND APPENDICITIS.

ARCH. MACLAREN discusses the influence of pelvic inflammatory conditions upon menstruation, and states that, in some cases of cystic ovaritis and ovarian abscess, he has seen satisfactory results following the removal of diseased appendages which had previously been overlooked. He states that in 200 laparotomies he had 158 cases where inflammatory appendages were removed, and in 40 per cent. of these the appendix was diseased. He comes to the conclusion that the trouble originated in the appendix, and spread to the ovary and tube. During the same time the author has operated on seventeen cases of appendicitis where there was no evidence of extension of the inflammation. In the discussion which followed, Skene said that the paper explained certain observations, which he had been unable to account for, of ovarian pain, undoubtedly caused by appendicitis, and which had disappeared when the appendix had been removed. Laphorn Smith mentioned that in nine or ten cases, where he had operated for tubal pregnancy or pus tubes, he had found the appendix firmly embedded in the tumour. In one case of tubal pregnancy, the specimen could be held up by the appendix. The salpingitis resulting from the appendicitis was probably the cause of the tubal pregnancy. — *Am. Journ. Obst.*, N. Y., July 1900.

ACUTE SENILE ENDOMETRITIS.

L. H. DUNNING reports two cases of the above condition, where the women were æt. 63, and had reached the menopause many years previously. Both patients had been in good health until a short time before examination, when a uterine discharge commenced, which was at first thin and irritating, and soon became sanguineous and offensive, accompanied by pain, lassitude, and increasing bad health. The skin was in both cases dry and sallow, in one case the uterus was normal in position, while in the other it was retroverted. Senile vaginitis was present in both cases. Hysterectomy was performed in both, and the uterine cavity found distended by a foul-smelling, sanguino-purulent fluid. After a thorough examination of both uteri, the author draws the following conclusions:—(1) The lesion present in both cases was an acute inflammation. (2) The characteristic pathological features were—(a) thickened endometrium, devoid of its epithelial layer; (b) increased vascularity, with peculiar arrangement of small blood vessels; (c) small round-celled infiltration; (d) diminished glandular elements; in a few glands, which were distinctly seen, the epithelium was desquamating, and their lumina filled with granular débris; (e) degeneration of the coats of the arteries of the muscular layer; (f) no connective tissue was found in any of the sections. (3) The mucosa of both cervix and body was involved, but was more marked in the latter. (4) The small-celled infiltration extended into the muscular layer, but was more marked in

the mucosa. (5) In both cases there was a cystic ovary, and in one an inflamed Fallopian tube, and peritonitis was present, indicating a spread of the inflammation from the uterus. (6) There was no marked stenosis of the internal os, although there was a considerable accumulation of fluid within the uterus.—*Ann. Gynæc.*, Boston, August 1900.

THERAPEUTICS.

UNDER THE CHARGE OF

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DIETETIC TREATMENT OF BRIGHT'S DISEASE.

REICHEL points out the diversity of the theories regarding the causation and nature of Bright's disease, and the difficulty of differentiating it from simple albuminuria. Drugs have little or no remedial action, and chief weight has always been laid on dietetic treatment, which, it is claimed, is based on scientific principles. This scientific basis Reichel denies *in toto*. He holds that, owing to our lack of true knowledge of the nature and causation of the disease, our treatment should be based on empirical observations. As a matter of fact such observations hardly exist. We have allowed our treatment to be affected by the prevailing theories of the pathology of the disease, and on the slender basis of metabolism theories have gradually built up elaborate rules regarding treatment. The kidneys are to be spared, the renal epithelium protected, metabolism products are feared as irritants, albumin is restricted to prevent auto-intoxication from retention of urea. So far has the elaboration gone, that now some meats, as game, white meat, veal, soups, etc., are not permitted on account of the large amount of kreatin and nucleic acid which they contain. Reichel holds that all this is pure theory. Only empirical observation can determine if these substances really do harm in Bright's disease. Such observation, to be of any value, must be made in mild cases which run an equable course. Kolisch reports such cases in which observation extending over many months failed to show any change, whether the patient was under a strict milk diet, or under an ordinary mixed diet. As the result of similar personal observations, Reichel holds that nephritic patients may be allowed to eat whatever they can take.—*Centralbl. f. d. ges. Therap.*, Wien, Jan. 1901.

ACTION OF MORPHINE ON THE STOMACH.

From experiments on dogs, Hirsch finds that morphine given hypodermically has a very marked action on the expulsive power of the stomach, and on the secretion of HCl. Normally, water poured into the stomach is all passed into the duodenum in about ten minutes. If, however, a

dog is given a hypodermic injection of 1 cgm. ($\frac{1}{8}$ gr.) of morphine for each kilo of body weight, there is an immediate spasm of the pylorus, which persists for hours, and is so severe that no fluid passes into the duodenum. There is no diminution in the peristalsis of the rest of the stomach, so that the delayed expulsion is not due to paralysis of peristalsis. This tonic spasm had already been noted by Rossbach and Reigel. As it has been shown that both the local ganglia and the muscle fibres have their excitability depressed after morphine, it follows that the tonic spasm must be central in origin, and this was proved, by Rossbach's experiment, when cutting the vagus caused abolition of the contraction on that side. Hirsch holds that probably the centre in the corpora quadrigemina is stimulated. In addition to this delaying of expulsion, morphine has a distinct effect on the HCl secretion. At first this is diminished, but afterwards is markedly increased. The initial diminution lasts the longer the greater the dose, and, according to Hirsch, is due to the elimination of morphine into the stomach (which lasts for about an hour), diminishing the activity of the gastric glands. The subsequent rise, he thinks, is probably due to a central stimulation acting through the vagus. Reigel, from experiments on men, found that morphine caused distinct delay in emptying of the stomach, and that the HCl is at first diminished and afterwards abnormally increased, and that these actions are proportionate to the dose, and always more distinct when the drug is given hypodermically than *per os*. Hirsch holds that there is a very remarkable correspondence between clinical and experimental observations. Consequently he is inclined to believe that there is also a tonic spasm of the pylorus in man, which may account for the griping pain frequently recorded after morphine.—*Centralbl. f. innere Med.*, Leipzig, 1901, No. 2.

CLINICAL EFFECTS OF ARTIFICIAL NAUHEIM BATHS.

FROM careful observations on thirteen different cases of heart disease, Battistini and Rovere conclude that, in almost every case, the bath is followed by a diminution in pulse rate, usually of from 10 to 20 beats. This effect lasts for several hours, and to a certain extent persists after the cure is finished. Arrhythmia was usually benefited, but not absolutely removed. The action on the blood pressure, as measured by Riva Rocci's instrument, was interesting. In most cases a distinct increase was noted, in one case up to 40 mm. This action seems to depend upon the strength of the bath, and especially on the amount of CO₂. In a case of Graves's disease the pressure always fell after the bath. In several cases of organic heart disease the first few baths were followed by a fall of pressure, with symptoms of dyspnoea and syncope, but as the cure went on the pressure tended always to rise. In one case which had the first baths while under the influence of digitalis, the resulting rise in pressure was greater, and the baths were better borne, than during a second series without digitalis. There was no relationship between pulse rate and blood pressure. The cardiac dulness was not altered after a bath, but as the cure went on the dulness gradually diminished in extent. The action on excretion of urine was not constant. The clinical results were good, the dyspnoea was relieved, the

pulse slowed, and the various engorgement removed. Though, in very severe uncompensated cases, the baths of themselves are insufficient, still, in combination with other medicinal treatment, they improve the circulation. The greatest benefit is obtained in cases where there is no organic disease of the heart, and in valvular disease, especially mitral cases. The authors think that probably, as Hensen states, the baths act on the heart muscles by training it to increased exertion, and not, as others hold, by lessening the work done by the heart.—*Ztschr. f. diätet. u. physik. Therap.*, Leipzig, Bd. iv. No. 7.

ADDISON'S DISEASE AND SUPRARENAL EXTRACT.

EDEL reports (*München. med. Wchnschr.*, 1900, No. 52) an undoubted case of Addison's disease which was distinctly improved by treatment with suprarenal tabloids. The patient was a man who had been ill for seven months, with increasing weakness, especially in the legs. Pigmentation had been noted for three months, and on admission the patient was quite unable to do any work. There was no gastro-intestinal disturbance, and no cough or spit. After being kept a month under observation, the patient was put on the tabloids, receiving daily four tabloids, each containing 1 gr. of the extract. In two or three days distinct improvement in the objective and subjective symptoms was noted. In a fortnight the patient was able to return to his work as a blacksmith. Along with this increased strength there was progressive fading of the pigmentation. At the end of five weeks the skin of the hands, face, neck, and penis had become normal in colour, and only in the neighbourhood of the eyes, and in the mucous membrane of the mouth, was there pigmentation. There had been no change in the diet of the patient. Unfortunately, after a month and a half, the patient developed tuberculous meningitis, which proved fatal in seven days. With the onset of meningitis the tabloids were stopped, with the result that the pigmentation returned, and even in the short time was already as marked as before treatment. Post-mortem, the solar plexus and the semilunar ganglion were found embedded in connective tissue, while there were tubercles only in the parenchyma of the right suprarenal gland.

SALOL IN DIABETES.

TESCHEMACHER (*Therap. Monatsh.*, Berlin, Jan. 1901) has tried Ebstein's plan of treating diabetes by large doses of salol. Of nine cases, three severe cases showed no improvement under salol, but the other six were markedly benefited. These were moderately severe cases, in which a strict diet caused the sugar to disappear from the urine, though the improvement was only very gradual. Salol caused the sugar to fall immediately. In one case it dropped from 4 per cent. to a trace, or less than 0.1 per cent., and in two other cases from 1.5 per cent. to 0 or 0.1 per cent. In a case where strict diet had only reduced the percentage

from 4·6 to 3·6, salol in five days caused the sugar to entirely disappear. The salol is administered in 15 gr. doses, four times a day, for five days. In no case were gastric disturbances or ringing in the ears noted. Teschemacher notes, as a hitherto undescribed observation, that the drug eliminated in the urine refracts polarised light to the left. In four normal urines, after salol was given, a refraction of from 0·4 or 0·5 was observed. So that Teschemacher concludes that, in the case of a diabetic patient taking salol, a refraction to the left of 0·3 to 0·5 represents either merely a trace of sugar, or at most 0·1 per cent. Teschemacher thinks that in salol we have a drug which can reduce the sugar to a trace in moderately severe cases of diabetes, within a few days. The action does not seem to last long, as the sugar gradually reappeared after the drug was stopped.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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HEREDITY OF TUBERCULOSIS.

HEREDITY is now universally recognised by authorities to play a very important part in the causation of tuberculosis, of more importance, indeed, in many cases, than the actual exciting factor, the tubercle bacillus itself. So great is the hereditary predisposition in many people, that, if they are exposed to the ordinary conditions of life, they may be said to be doomed with certainty to become, sooner or later, the victims of the disease, for there is practically enough tubercle bacillus everywhere to light up the disease in them. This opinion is based chiefly upon experience of the disease in the human subject, but also to some extent upon animal experiment. This last part of it has recently received corroboration from a series of experiments in guinea-pigs by Carrière (*Arch. de méd. expér. et d'anat. path.*, Paris, Nov. 1900, p. 782). His results are shortly summarised as follows:—(1) Tuberculous poisons influence gestation, for if they be injected into guinea-pigs, they diminish the number of the offspring, or provoke their death. Further, in the case of live progeny, there is a tendency to constitutional feebleness and premature death. These results are always most accentuated if both parents be impregnated with the poison, and least so where the male only is affected. Post-mortem examination of the progeny which succumbed within fifteen days after the injection of the parents, revealed no bacillary lesions of any kind, either macroscopic or microscopic, the toxines produced by the cultures being the most active and hurtful agents. (2) He then examined more specifically the tendency to the acquisition of tuberculosis, by comparison of experiments made with the progeny of healthy non-tuberculous parents and of tuberculous parents respectively, and found practically the same results, namely, that the injections of tuberculous poison into the parents rendered their progeny

more liable to acquire tuberculosis than the progeny of the healthy control animals; and that this tendency was greatest if both parents had been infected, and least so when the father alone had been.

AGGLUTINATION OF THE TUBERCLE BACILLUS BY TUBERCULOUS EFFUSIONS.

COURMONT (*Arch. de méd. expér. et d'anat. path.*, Paris, Nov. 1900, p. 697) has here extended the observations of Arloing and himself, made in 1898, upon the agglutinating power of the blood in tuberculosis upon the tubercle bacillus, in a further series of observations and experiments made during the last two years, chiefly upon the various tuberculous effusions. The technique of the examinations is much the same as that employed in their previous examinations, and need not be gone into here. His results may be summed up under the following heads:—

1. *Interpretations and applications.*—The most interesting fact obtained is the relation which appears to exist between the gravity of the tuberculous serous affections and the intensity of the serum reaction. This result is in keeping with the views come to by other workers, such as Mongour and Buard, and Bendix. Grave or fatal pleurisies, human or experimental, give most frequently a negative reaction, and only sometimes a very feeble positive one, while mild and curable pleurisies, both in man and animals, give a very positive reaction. Experimentally it was shown that, if an animal already possessed the agglutinating power, it could be gradually diminished by injecting a virulent tuberculous culture, or exalted by injecting a very attenuated one. This same relationship, namely, that the agglutinating reaction is very often in inverse ratio to the gravity of the infection, is seen in typhoid fever, pneumococcal infection, and probably holds good in the majority of infectious diseases in man. Between these two extremes, there are many cases in which the same positive diagnosis cannot be drawn from a feeble or strong reaction; the reaction depends so much upon the development of the local lesions, and the general prognosis upon the general state, the condition of the lungs, heart, etc.; but help may be given even here by a careful comparison of the serum reaction with that of the blood reaction, especially when spread over a series of observations. Courmont next studied the place of formation of the agglutinating substances present in tuberculous effusions. It was shown that the agglutinating power of the serous effusions may be equal to greater or less than that of the blood. Observations upon similar effusions due to the typhoid bacillus have established that the agglutinating power of the serous effusions may first come from the blood, and that it may become diminished in intensity through the local action upon it of the bacilli in the effusion. Courmont believes that this also holds good of tuberculous effusions, and that the exaltation above that of the blood is to be explained by the formation *in situ*, at times in the serous effusions, of more agglutinating substances, probably of the nature of a defensive reaction.

2. *Importance in diagnosis.*—The serum reaction is of the greatest importance in diagnosis, for it is more rapid than all other diagnostic

procedures, whether by culture or inoculation, and further, is absolutely harmless to the patient. He obtained the following results:—(1) Non-tuberculous serous effusions do not agglutinate the tubercle bacillus in dilutions of 1 in 5, or over, while the majority of tuberculous effusions do so in dilutions of from 1 in 5 to 1 in 20. (2) A certain number, generally the very grave ones, do not give the reaction. This may also occur in mild forms, but a repetition of the examinations, especially towards the recovery of the lesions, generally obtains it. (3) The agglutinating power of the blood is not always equal to that of the serous effusions. It may be greater or less, or present in it when absent in the effusion, and *vice versa*. (4) In favourable cases it generally progressively increases both in the blood and the effusion. (5) These results obtained by observations in the human subject were all confirmed by experiments on animals.

THE AGGLUTINATION OF THE BACTERIA FOUND IN CYSTITIS AND PYELITIS.

BROWN (*Boston Med. and Surg. Journ.*, November 8, 1900), in a number of cases, tested the action of the patient's blood serum upon the specific bacteria found in the disease, with results pointing to the diagnostic usefulness of the test in such cases. In a case of cystitis of many years' standing, caused by the *Bacillus coli communis*, a pure culture of the bacillus showed well-marked clumps in ten minutes after the blood serum, diluted ten times, had been added to it. A case of cystitis and pyelitis due to the *B. proteus vulgaris* gave a similar reaction in the same time with a pure culture of the *proteus vulgaris*, but another of four years' duration failed to do so even after sixty minutes. Another case of acute cystitis, supposed to be due to the *B. typhosus*, gave a positive reaction in dilutions of 1 to 80, and, so far as could be ascertained, the patient had never suffered from typhoid fever.

THE SERUM DIAGNOSIS OF TYPHOID FEVER.

DOMBROWSKY (*Vratch*, St. Petersburg, 1900, Nos. 4-5) gives the results of his observations with the Widal test in ninety-six cases of doubtful typhoid fever. The dilutions he employed were 1:25, 1:50, 1:100 and 1:200, and the time limit was a half to two hours. He also compared his microscopic results with the macroscopic sedimentation test, giving a time limit of sixteen hours for the latter. A positive result was obtained in eighty-three and a negative in thirteen of the cases. In all the former, subsequent developments corroborated the diagnosis, and all of the thirteen negative cases were also subsequently shown to be due to other diseases, such as pneumonia, tuberculosis, pyæmia, etc. In fifty-two of the eighty-three positive cases rose-spots were present. In sixty-two both the macroscopic and microscopic results coincided. In twenty-one the reaction was obtained microscopically with a dilution of 1:200, while macroscopically no reaction was observed in ten, and only very feebly in the other eleven; but with dilutions of 1:50 or 1:100 the results obtained by both methods agreed in all cases. The time taken for the establishment of the microscopic reaction in the different

cases was as follows:—Ten minutes in one (the shortest time), within half an hour in fifty-five, within an hour in twenty, within one and a half hours in five, and within two hours in two. The shortest time in which the macroscopic reaction occurred was half an hour in one case, and in other two cases it was one and a half hours. In one case a positive (microscopic) result was obtained, and a subsequent post-mortem showed only intestinal tuberculosis, but a previous attack of typhoid could not be excluded, hence no deduction can be drawn from it. In another suspected typhoid case, in which tubercle bacilli were found in the sputum, the Widal reaction was negative, while the post-mortem showed the co-existence of tuberculosis and typhoid fever. The failure of the test in this case was probably due to the destruction of the resistance of the organism by the more virulent infection. The blood of four convalescents was examined. In two the agglutinating properties disappeared within three months, and in the other two it was still present at the end of five months. In the blood of eighteen patients, suffering from pulmonary tuberculosis, agglutinating properties were found in six; in three, in a dilution of 1:10; and in the others in a dilution of 1 in 25; but in no case was a positive reaction obtained with a dilution of 1 in 50. The blood of twenty healthy individuals gave uniformly negative results in a dilution of 1 in 10, although in two a reaction was obtained with a dilution of 1 in 5.

A POSSIBLE CAUSE OF CLUMPING IN BACILLI.

LAUDER BRUNTON (*Journ. Path. and Bacteriol.*, Edin. and London, 1900, vol. vii. p. 53) gives particulars of an ingenious experiment which refers the clumping of bacilli to differences in their surface tensions. A number of lucifer matches are covered with hard soap, and thrown into water coloured blue with litmus (any large flat trough does very well). They float about indifferently, but if the water be acidulated they at once draw together into clumps, the water at the same time becoming red. If an alkali be now added, the blue colour is restored, and the clumps if stirred with the finger break up, and do not re-form. He was led to this by imitating blood corpuscles with small discs of cork, loaded at one side to make them float in an upright position. When partially submerged they quickly run together and form rouleaux. If totally submerged they remain indifferent, and do not seem to attract one another; but if they are first dipped in petroleum they readily run together, even when submerged (Norris). He therefore covered the cork discs with soap, so that they were readily wetted by the water, and found that they remained indifferent, but on acidulating the water they formed rouleaux, as before. The effect of the acid had been to decompose the surface of the coating of soap, and form a thin layer of fatty acid, which was not wetted by the water. He therefore thinks that the formation of rouleaux by the red blood corpuscles and of clumps by bacteria is due to some slight alteration in their surfaces, and this may not improbably be due to the liberation of some fatty substances by means of carbonic acid. In the case of typhoid bacilli the clumping depends first on the death of the flagella which render the bacilli motile, and thus tend to keep them apart,

in spite of any addition to their surfaces ; and, secondly, upon alteration in their surface tension, which tends to produce clumping.

A CASE OF GONORRHOEAL ULCERATIVE ENDOCARDITIS WITH
CULTIVATION OF THE GONOCOCCUS.

LARTIGAN (*Am. Journ. Med. Sc.*, Phila., January 1901, p. 52) gives particulars of a case (male, æt. 20) in which he found the gonococcus in the lesions of the heart valves, and was able also to cultivate it with some measure of success. Reference has been made to this subject in a previous number of this Journal, and it is unnecessary to do more than merely notice very shortly the essential points in the present case. The number of cases in which the gonococcal nature of the endocarditis has been fully shown does not exceed six, and, as in the present case, the attempts at cultivation of the organism from the heart valves, although in a measure successful, have not been conspicuously so. It is interesting to note that the affected portion of the urethra showed losses of epithelium with considerable round and polymorpho-nuclear cell infiltration in the tissue underneath. A considerable number of micrococci arranged in pairs, with the characteristic morphology of the gonococcus, were present on the surface and in the inflamed tissue. They decolorised by Gram, and some were noted with an intracellular position within the leucocytes. Other cocci, oval in form, and not decolorising by Gram, were likewise present, but extracellular in position. The author's conclusions from his case are those come to by others, namely, (1) Gonococcal urethritis may be the starting point for a fatal septicæmia, induced by a pure infection with the gonococcus ; (2) endocarditis and arthritis are occasionally complications of such an infectious disease ; (3) the endocardial processes may be incited by the gonococcus without the association of other organisms.

STRUCTURE AND ORIGIN OF THE CAVERNOMATA OF THE LIVER.

SCHMIEDEN (*Virchow's Archiv*, 1900, Bd. clxi. p. 373) contributes an interesting and well-written article, in which he discusses the five theories, so far proposed, to explain the origin of the cavernous angioma of the liver, and adds a sixth, based upon a study of thirty-two cases made in Orth's laboratory. These liver growths are well known. They are usually found accidentally at post-mortems, and have no clinical importance. They have, indeed, little pathological importance, and their chief interest lies in the obscurity which surrounds their origin. The five theories are—(1) Primary growth of connective tissue ; (2) vascular congestion ; (3) primary atrophy of liver cells ; (4) biliary congestion ; (5) hæmorrhage. The first of these has, so far, received most general acceptance, although the second has many supporters. The other three have little or no evidence in their favour. The sixth, now added by Schmieden, is a developmental anomaly or defect ; that it belongs to a group with the other tissue malformations occurring in the liver and in other parts of the body. They do not belong to the same class with the cavernous angiomas of the other organs, for example, of the skin. While the latter are to be regarded as true blood vessel tumours, the

liver cavernomata can be regarded as tumours only in a broader sense of the word. The term cavernoma or nævus cavernosus hepaticus is preferable to cavernous angioma or any other.

THE TOXICITY OF DIFFERENT SPECIMENS OF *BACILLUS COLI COMMUNIS*.

HARRIS (*Journ. Path. and Bacteriol.*, Edin. and London, 1900, vol. vii. p. 22) has made a useful contribution to this difficult subject. In his experiments he used only those cultures of *B. coli* which satisfied the three following tests:—(1) Non-liquefaction of gelatin; (2) the production of indol in peptone broth within one to one and a half days; (3) the curdling of milk when incubated at about 37° C. Guinea-pigs and rabbits were used, and the greatest effect was obtained by intraperitoneal injection, next by intravenous, and least subcutaneously. Toxic results were obtained with some cultures and none with others, about half of his experiments being non-lethal with ordinary doses. He suggests three possible explanations—(1) Toxicity is a non-specific property, which is lost under certain circumstances. If this be so, it is difficult to account for some species retaining and others losing it when cultivated under exactly similar circumstances. (2) The *B. coli* is of itself primarily a non-toxic organism, but that when cultivated under certain conditions, the non-specific property of toxicity may be impressed upon it. If this be so, why are not all species brought to the same degree of toxicity by the same artificial means? (3) The term *B. coli* includes different species of organisms, which can be divided into at least two groups, namely, those isolated from inflammatory exudations which are toxic, and those from water, sewage, etc., which are hardly, if at all, toxic. The author is inclined to agree with this view, and thinks it as reasonable to separate them into different species, because of their markedly different effects upon animals, as to include them under one species because they agree in their morphological and growth characters. This is in keeping with the results obtained by several observers, namely, the nervous symptoms of atrophic paraplegia, accompanied by changes in the spinal cord, indicating anterior poliomyelitis after inoculation with some, but not all, specimens of *B. coli*. The human diseases in which organisms belonging to the group of the colon bacillus have been isolated, are peritonitis, arteritis, cholera nostras, epidemic diarrhœa, pleurisy, meningitis, cystitis, etc. In the cases in which the bacillus is cultivated from the blood, its causal relation to the disease is almost certain, but its connection with such affections as diarrhœa and enteritis is not clear unless the blood is proved to contain it in great numbers. Its presence in cholera stools, in inflammatory exudations, etc., in almost pure culture, might be explained on the supposition that in these cases the bacillus has provided for it a particularly favourable nutrient medium for growth.

THE BACTERIOLOGY OF BRONCHITIS.

RITCHIE (*Journ. Path. and Bacteriol.*, Edin. and London, 1900, vol. vii. p. 1) examined forty-nine cases of acute bronchitis, and found pathogenic

bacteria present in considerable numbers in all but six, where the bacteria which had caused the disease had probably lost their vitality by the time the bacteriological examination was made. His conclusions are as follows :—(1) Acute bronchitis is an infective disease. (2) It is not due to any specific micro-organism ; various bacteria are found in the bronchitic secretion. (3) Some of these bacteria are exciting causes of the bronchitis. (4) The disease is more often due to mixed infection than to the action of one form of bacterium alone. (5) The most important causal bacteria are *Diplococcus pneumoniae* and streptococci. (6) The influenza bacillus not infrequently causes bronchitis, apart from epidemic influenza.

PHYSIOLOGY.

UNDER THE CHARGE OF

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ABSORPTION OF FATS AND SOAPS IN LARGE INTESTINE.

COMPARATIVELY little work has been done in this subject, and the small amount that has been carried out has given by no means definite results. Munk and Rosenstein injected oil emulsions into the rectum, and then estimated in a chyle fistula the amount of fat present in the lymph. These experiments, which were conducted on man, did not give definite results, because there was always the possibility that the slight increase in fat in the lymph was due to an absorption of the emulsion in the small intestine. Certain investigations, which were published by de Filippi in 1894, on fat absorption in a dog where the stomach and a very large portion of small intestine (1·9 metres) had been removed, although of value as showing that even under such adverse conditions fats could be well absorbed, were inconclusive with regard to the rôle of the large intestine, owing to the fact that 23 cms. of small intestine still remained. H. J. Hamburger has investigated the subject anew and more fully than his predecessors, in a paper published in the *Arch. f. Physiol.*, Leipzig, 1900, S. 493. The fat which he employed was that described by v. Mering as lipanin (mixture of olive oil with 6·4 per cent. oleic acid). His first experiments were carried out on three equal portions of intestine, which were separated from one another by ligatures, and into the middle one of the three an emulsion of lipanin in $\frac{1}{2}$ per cent. Na_2CO_3 was injected, the other two remaining empty. The abdominal wall having been closed, the animal was kept in narcosis, and four hours later the bowel was exposed and the three portions removed. The fat remaining in the middle portion was estimated, and also that present in the mucosa of each of the three portions, the two lateral portions being used as controls. It was found that in four hours 0·145 grm. of fat out of 0·644 grm. had disappeared from the intestine, that is to say, had passed beyond the mucosa. In subsequent experi-

ments the results were practically the same, so that there can be no doubt that in the large intestine fat may be absorbed. The author draws attention to the interesting appearance of fat drops on the surface of the mucosa of the middle portion at the close of the experiment, and he explains this on the supposition that the Na_2CO_3 , being rapidly absorbed, the fat can no longer remain in the form of a fine emulsion, and therefore is left in a condition unsuitable for rapid absorption. Robert had previously referred to the exceedingly slow absorption of fat from the large intestine of man, unless the oleaginous substance was in the form of a very fine emulsion. Deucher (*Deutsches Arch. f. klin. Med.*, Leipzig, Bd. lvii. S. 210) and Plantenga (Inaug. Diss., Freiburg in Baden, 1898) referred to the very slow absorption of fat from the ordinary complex nutrient enemata.

Hamburger next investigated the absorption of soaps from the large intestine by three different methods. In the first place, he employed the one which has already been described for fat absorption. The second method consisted in forming a blind loop of gut, with a funnel in the open end which permitted of elevation or depression, and in pouring into this, solutions of soaps, and subsequently estimating for a given time the amount that had been removed by absorption. In the third method a fistula in the large intestine was formed, and soap solutions introduced per rectum, closure of the gut below being obtained by a balloon-like arrangement. Known amounts of the soap having been injected, the residue, after a fixed time, was washed out of the bowel and the fatty acids estimated, the difference giving the amount absorbed.

The author carried out a series of experiments by each of these methods, and found in all cases a well-marked absorption of soaps. What becomes of the soap after absorption? It is known that fatty acids when given by mouth appear in the chyle in the form of fats, and that even comparatively small quantities of soap are toxic when injected intravenously. Hamburger estimated the amount of fat in the mucosa of the large intestine after injection of soap solution, of course deducting by means of calculation from controls the amount of fat naturally present in the mucosa before the introduction of the fatty acid. In all cases he found it to be increased, so that there seems to be no doubt that the mucosa of the large intestine is capable of transforming fatty acids into fats. Not only is this the case with the intestine left *in situ*, but the process goes on outside the body, if soaps be left in contact with the mucosa at a temperature of 38°C . A temperature of 80° – 90°C . at once checks the action. The mucosa of the large intestine of the horse, even when finely subdivided, still retains this power of transforming fatty acids into fats. After eight hours the fat formed in this way begins to be transformed again into fatty acids. Hamburger also estimated the amount of fat absorbed from lipanin soap emulsions as compared to lipanin Na_2CO_3 emulsions. He found that the former combination was by far the more easily absorbed.

Comparison between the small and large intestine with regard to fat absorption.—When the same area of mucosa is exposed to the fats or soaps in the two cases, it is found that the large intestine is the more actively absorbing surface. This of course by no means holds true for the bowel under normal conditions, when the contents of the small

intestine are far more suitable for absorption than those of the large intestine. This paper contains results which are not only of physiological but also of clinical importance, in so far as they definitely settle the question as to the power of the large intestine to absorb fats or soaps.

In a subsequent paper in the same journal (*ibid.*, S. 544), the author refers to the changes in the fat after absorption. It is known that the fat in the lacteals is in a finer state of subdivision than in the columnar epithelium of the villi, and the explanation which the author puts forward, that the action is due to the slow but prolonged movements of the lymph aiding emulsification, is based upon some experiments which he carried out with ascitic fluid. He found that this was able rapidly to emulsify large quantities of lipanin, the resultant mixture containing the fat in the very finest particles. A still more interesting observation in the same paper deals with a subsequent change in the fat.

Cohnstein and Michaelis (*Arch. f. d. ges. Physiol.*, Bonn, Bd. lxxv. S. 76, and Bd. lxxix. S. 473) showed that when chyle fat was added to blood, and a stream of air passed through the mixture, the fat gradually disappeared, and in its place a compound, soluble in water, appeared—a fat-splitting action. This action seems to be due to a lipolytic enzyme, and was believed by the two above-mentioned authors to be derived from the blood. Hamburger, however, has pointed out that blood is unable alone to split up the fat, just as the passage of air alone is unable to do so, the essential factor in the action being undoubtedly the chyle, which is aided by the blood, and the stream of air. It is uncertain, both as to the way in which the blood exerts its influence and also to what constituent of the blood this action is due. The author is inclined to believe that the corpuscular elements are the active ones.

Are the lacteals the sole vessels which deal with the absorbed fats?

Claude Bernard put forward the view, that the blood vessels were concerned in fat absorption, because he found that the serum of the portal blood in mammals was during digestion white, like milk. At Heidenhain's request, Bornstein estimated the amount of fat in the portal blood, compared to that in the carotid, and found that the former contained rather less than the latter during digestion. Some more recent experiments, however, by v. Walther and v. Frank have again brought into prominence the older view of Bernard, and a recent investigation by Hamburger (*ibid.*, S. 554) has introduced further evidence in its favour. He adopted the same operative procedure that has been described for the investigation of absorption of fats from ligatured pieces of intestine. In this later series of experiments he tied the smaller and larger chyle vessels passing from one of the portions of bowel, and then estimated the amount of fat absorbed, compared to that removed from a similar piece of gut with the vessels left untied. He found that, in spite of the lacteals being tied, both fats and soaps were absorbed, although hardly to the same extent as when the vessels were patent. He therefore concludes that these channels are not the only ones for the carriage of the fats, and therefore regards the blood capillaries as also playing a part in absorption. The experimental conditions are, however, so far removed from the normal ones, that great care requires to be exercised in drawing conclusions from them.

THE ACTION OF PHLORIDZIN ON THE KIDNEYS.

ALTHOUGH a very large number of papers have appeared on this subject, the general effect of phloridzin on the animal organism has been by no means fully worked out. Although it was pointed out by v. Mering and Zuntz that the glycosuria and polyuria were due to a direct stimulation of the secreting elements of the renal parenchyma, very few investigations have been carried out dealing with the pathological histological alterations in the kidneys. In fact, there is only one exhaustive piece of work on the subject, and that was published by two Italians, in *Beitr. z. path. Anat. u. z. allg. Pathol.*, Jena, Bd. xiv. S. 34. They found changes similar to those described by Ebstein in diabetic kidneys, namely, glycogenic and hyaline degeneration. These changes, of the nature of a coagulation necrosis, were noticed when phloridzin was given by mouth to dogs, but were absent in rabbits. The urine was always albuminous. F. Coolen (*Arch. de pharmacod.*, Gand and Paris, tome i. p. 277) regards the albuminuria which the Italian authors noticed, as quite independent of the phloridzin, because he was able to produce chronic poisoning with this glucoside, without albumin appearing in the urine. His investigations are, however, scarcely comparable with those of Trambusti and Nesti, because he made no histological examination, and in addition injected the drug subcutaneously, while they gave it by mouth. Von Kossa (*Ztschr. f. Biol.*, München, 1900, S. 326), in a recent paper, refers to the difference between subcutaneous injections and feeding with this glucoside in the case of dogs, the latter producing albuminuria, while the former does not. This investigator found that even in rabbits there were distinct pathological alterations in the kidney, and constant albuminuria. As rabbits are frequently employed for the production of phloridzin diabetes, it is very important to bear in mind that the nitrogen metabolism may be affected by the loss in albumin, apart from other alterations. It is peculiar that this condition of albuminuria should have escaped the attention of the numerous workers on this subject, even when very large doses of the glucoside have been given. In order to produce glycosuria more easily by this drug, Cremer and Ritter (*Ztschr. f. Biol.*, München, N. F., Bd. x. S. 459, and Bd. xi. S. 259) gave along with it carbonate of soda. One must remember, however, that the carbonate alone, on subcutaneous injection into rabbits, can produce albuminuria. The histological changes in the kidneys of the affected rabbits were similar to those described by the Italians as occurring in dogs—cloudy swelling, granular degeneration of the cells of the convoluted tubules; and in some cases isolated capillary loops in the glomeruli were almost entirely deprived of their epithelium. One has to be careful in drawing conclusions from these appearances, owing to the fact that rabbits so easily show renal alterations when kept in laboratories, and it is almost impossible to keep them for any length of time without the occurrence of albuminuria.

DISEASES OF THE EYE.

UNDER THE CHARGE OF

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AND

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THE DANGERS TO LIFE AND TO VISION FROM LIGATURE OF THE
CAROTID ARTERY.

OUT of 997 cases, of which Siegrist was able to find the records in literature, in which the common carotid had been ligatured, Siegrist (Basel) discovered forty-two in which some disturbance or other was subsequently complained of in the corresponding eye. But of these, nine were cases of suppuration of the globe secondary to that of the wound, and cannot therefore be counted in. In fourteen cases there was temporary impairment of sight, with more or less rapid recovery, and as these were nearly all young patients, in whom the operation was required on account of severe loss of blood, it is not unlikely that the blindness may have been due to temporary failure in the circulation. This is seen to be the case in rabbits in which the operation has been performed, for the ophthalmoscope shows a transitory pallor of the disc and narrowing of the vessels. In five cases strabismus occurred, which almost certainly indicates that some extensive cerebral lesion had been present, and, as a matter of fact, four of these five died. In two cases the blood supply to the Gasserian ganglion was thought to have been interfered with, as corneal opacity resulted. The author had two interesting cases under his own care. In the first, the external carotid was tied preliminary to excision of the tongue for cancer, but violent hæmorrhage occurring on the eighth day, the common trunk was ligatured. On the same day there was total loss of vision of the eye on the same side, with the typical appearances of embolism of the central retinal artery. Before the patient's death, four days later, there had been some signs of movement again in the retinal circulation. The second case was that of a young man who developed pulsating exophthalmos after a fall; on account of this the external and internal carotids on one side were tied simultaneously. The next day failure of vision was complained of, and with the ophthalmoscope the disc could be seen to be slightly pale; there was a light cloud over the central region, and the vessels were narrowed. The eye became quite blind, and some months later these changes were all much accentuated, while sprinkled through the choroid were flakes of pigment. About eighteen months after, large areas in the fundus were completely deprived of all pigment, and showed the choroidal vessels entirely sclerosed. No retinal vessels whatever were to be seen. It is probable that all these changes were due to thrombosis spreading from an arterio-venous aneurysm to the ophthalmic artery.

In the cases in which death followed the operation (at least in which

death could fairly be said to be due to it), the patient was either cachectic and weak, or of advanced age, or the heart and vessels were much diseased. It is to these considerations that reference should be made in dealing with prognosis.—*Arch. f. Ophth.*, Leipzig, 1900, Bd. 1. Heft 3.

TOXIC OPTIC NEURITIS.

THE toxic substances, both extraneous and endogenous, which are capable of giving rise to defects of sight, more or less complete, are now recognised to be considerable in point of numbers, and while some of these are of fairly frequent occurrence, others are, at least in this country, extremely rare. At the Paris International Congress, Uthloff of Breslau read an interesting and instructive paper on this topic, showing how the various forms may be divided into two groups, represented by tobacco and quinine respectively. In the tobacco and alcohol group, the chief features are retrobulbar neuritis, a central scotoma, and a normal periphery of the field. To this group belong also bisulphide of carbon, stramonium, arsenic, iodoform, and cannabis indica, among extraneous poisons, and similar symptoms are occasionally produced by the toxins occurring in the course of diabetes, gout, cancer, pregnancy, lactation, and the puerperium. Uthloff does not pretend that in all of these conditions has anatomical examination furnished verification of the probable condition, but, judging from analogy, and from similarity of symptoms, he thinks this a fair deduction. In all, the ophthalmoscope shows very slight inflammatory changes in the disc, and the subsequent atrophy is almost confined to the outer portion of it, while alterations of the retinal vessels are late of appearing or never do so. In the quinine group, the chief features are marked pallor of the disc, narrowing of the retinal vessels, peripheral restriction of the field, and absence of a central scotoma. There is, it must be noted, more defect of vision than is to be accounted for simply by the reduction in the calibre of the retinal vessels, extreme though it be, and in this relation it may be remarked that ergot has never been known to produce any visual symptoms; Uthloff believes, therefore, that in addition to the above cause, there must be a direct toxic action of the substances of this group upon the nerve elements. The other substances in this group which may be mentioned are salicylic acid, male fern, and pomegranate. Lead occupies a position midway between the two groups, for both neuritis and extreme vessel changes may occur. Visual lesions have been noticed also in poisoning with anilin and nitrobenzol, and in snake-bite and pellagra, but the symptoms have not as yet been clearly defined. It is very striking, on the other hand, to observe that in a number of conditions of auto-intoxication, such as Addison's disease, jaundice, and myxœdema, no visual symptoms occur. It will be noted, on looking at the list of substances producing amblyopia in the two lists above, that those which give rise to optic neuritis are also capable of causing other forms of peripheral neuritis, and those in the second group are not. He thinks that one can thus gain some insight by means of the ophthalmoscope into the processes going on in other nerves, which may at the same time be suffering similarly. Further, it is important to notice that a number of poisons are able to cause peripheral neuritis which are not known to

injure the optic nerve—for example, copper, mercury, carbonic acid, silver, and tuberculosis.—*Klin. Monatsbl. f. Augenh.*, Stuttgart, August-September 1900.

KRÖNLEIN'S OPERATION.

UNTIL the suggestion of this method of obtaining free access to the orbital cavity, it was hardly possible ever to succeed in removing a tumour lying posterior to the globe, without at the same time removing the eye itself; but since 1887, when the operation was first thoroughly described, it has been performed forty-five times or thereby. Curiously enough, however, though no doubt it may have been performed by British surgeons, there is no published account of such having been done. The great difficulty in the anterior route to the apex of the orbit is of course the need for endeavouring at least to retain an eye which may yet possess some sight, and at all events the loss of which would be a great disfigurement to the patient. Many a time the attempt was made, to the great inconvenience of the surgeon, and perhaps to the detriment of the completeness of the operation, and had to be given up after all. Many a time, too, it must have appeared best, for the sake of thoroughness of removal of a neoplasm, simply to begin by sacrificing an eye which may still have retained a good deal of valuable sight. It must be remembered in this connection that a new growth may exist at the apex of the orbit for quite a long time without damage to the sight, provided it does not actually involve the tissue of the optic nerve, or cause so much proptosis as to lead to ulceration of the cornea. For the details of Krönlein's method one must refer to the original article, but the main idea in it is to obtain access to the apex of the orbit from the temple. An incision is made following the line of the outer margin of the bony orbit, then a flap of bone with the overlying soft tissues, but denuded of its periosteum on the orbital face, is loosened from the outer side and rolled back over the temple; when the periosteum is now cut through, free access to practically the whole orbit is readily obtained. A tumour of any sort may thus be thoroughly removed, a deep-seated orbital abscess cleared out, etc., without any risk of injury to the eye itself. Without going too much into details, one may say that out of the forty-five recorded cases there was only one death, and that was the case of a patient in whom a tumour of the orbit existed and was removed, but who died from intracranial invasion of the new growth. Owing to involvement of its tissues in the growth, or for other reasons, the globe had to be removed in one or two instances, but in all the others recorded the eye was retained—an immense gain over the results by the anterior route. In all the cases, too, in which the optic nerve or globe had not been actually attacked, vision was not in any way injured by the performance of the operation; the chief danger is of injury to muscles (especially the external rectus), damage to any of which will lead to double vision subsequently. It depends very much upon the attachments of the tumour whether this can be accomplished or no; the resulting scar is trifling. From every point of view Krönlein's operation is a great advance on former methods.—*Beitr. z. klin. Chir.*, Tübingen, 1900, Bd. ii. and iii.

TRANSVERSE FILM OF THE CORNEA.

IN a considerable number of cases in which the globe has for any reason shrunk and the tension has permanently become lowered, a peculiar band is to be seen stretching across the cornea just below the horizontal meridian, exactly at that part of the cornea which is most fully and most constantly exposed to the action of the outer air. According to recent investigations by Best (Giessen), the earliest stage in its formation is the deposition of a finely granular material in the remains of Bowman's membrane which has been broken up, and in the anterior layers of the corneal tissue proper. This he believes to be a precipitate from the nutrient fluids of the cornea, which gives reactions indicating that it is of the nature of fibrin. This material very readily undergoes calcareous degeneration, though even in an advanced case it is by no means all thus transformed. The author concludes that in an eye whose nutrition is gravely interfered with by some cause or other, such as shrinking of the globe, the additional irritation of that portion of the cornea which is constantly exposed to wind and weather may give rise to a reaction, which in character differs somewhat from an inflammation of the ordinary type. It is but very rarely that the condition arises in any case except those in which the eye has been previously manifestly diseased, and it is very often nearly completely blind before any serious development occurs.—*Beitr. z. Augenh.*, Hamburg and Leipzig, 1900, Bd. xliii. Heft 1.

LIVER TREATMENT OF NIGHT-BLINDNESS.

BUCHANAN has used this method among some patients under his care in an Indian jail with remarkable success. It seems to be rather a common symptom, comparatively, in Bengal, and though all his patients had suffered from malaria, he does not regard this as of much importance among a population of whom this fact is almost universally true. In one or two there was some suspicion of scurvy, but others were stout and well nourished; there was no reason whatever to suspect malingering. The quantity given was about 8 oz. of goat's liver, fried with oil and spices, twice a day, and no drugs were used. Retinitis pigmentosa was not seen among the patients, but the sealy condition of conjunctiva, which often accompanies it, was repeatedly found.—*Indian Med. Gaz.*, Calcutta, November 1900.

OPTIC ATROPHY FOLLOWING MUMPS.

ATROPHY of the optic nerves may follow any of the infective fevers, though it is fortunately a rare complication, but mumps is so apt to be regarded as an innocent disease, that it alarms one to think of loss of sight as a possible sequela. Dor of Lyons has, however, apparently seen two cases, both, curiously enough, occurring in young men, in whom a neuro-retinitis came on, in one case a month, in the other a little longer, after an attack of mumps acquired during military training. In both cases, though the loss of sight was not complete, vision was reduced eventually to the ability to count fingers a few feet away; treatment appeared to be of very little benefit, the atrophy progressing in spite of the remedies employed.—*Clin. opht.*, Paris, August 25, 1900.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH OBSTETRICAL SOCIETY, *February* 13, 1901.—Dr. MILNE MURRAY, President, in the chair.—SPECIMENS were shown by Drs. HAULTAIN, BREWIS, DEWAR, HAIG FERGUSON, and Professor SIMPSON.

COMMUNICATIONS.—In the unavoidable absence of Dr. Halliday Croom, his paper on "Psychoses following Pelvi-abdominal Operations" was read by Dr. HAIG FERGUSON. The paper appears in the present number of this Journal.—Dr. BERRY HART read his paper on "Apparent low Implantation of the Ureteric Opening." He showed that several cases had been recorded in which one ureter was found opening in the vulva at the margin of the hymen. He then mentioned cases by Baker, Davenport, Benckiser, Sängner, and Olshausen, most of which had been cured by operative interference. The procedure in these was very much the same, and consisted in excising the lower portion of the abnormal ureter and turning the divided end into the bladder. The results were generally quite satisfactory. In most of the cases there were two ureters—one normal and the other abnormal as described. In one at least there were two opening normally and a third abnormal. The question was the origin of the abnormal duct. Sections of portions of the excised duct had shown it in every case to be ureteric in structure, and it remained to decide whether it were wholly ureteric in origin or whether the lower part were not a Wolffian duct remaining patent. After discussing the part played by the Wolffian body and its duct in normal development, Dr. Hart held that in these cases the abnormal duct consisted of ureter only in its upper part. The rest was formed of the Wolffian duct and its primitive connection with the ureter, both of which had persisted and had remained patent. This view was, he stated, the opposite of that commonly held by the continental authorities. In conclusion, he said that it was eminently possible that some obstinate cases of incontinence of urine might well be due to this condition, which had been overlooked possibly from carelessness, but more probably from want of knowledge that such a condition occurred.—Two cases by Dr. FOTHERGILL of Manchester, one "A Case of Uterine Fibroid with unusual Sequel," and the other "A Case of Pregnancy with Ovarian Cyst," were held as read.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY, *Feb.* 6, 1901.—Mr. A. G. MILLER, President, in the chair.—Mr. MAYO ROBSON of Leeds read a paper on "Hæmatemesis, with Notes of Cases." He urged the necessity of more frequent surgical interference in the treatment of gastric ulcer, as the risk of perforation or hæmorrhage was imminent in every case of neglected or imperfectly treated gastric ulcer. If

hæmorrhage did not yield to the ordinary medical treatment in a few hours, or if a second hæmorrhage occurred, then surgical aid should be sought. The various methods of dealing with any ulcers found were then described. Speaking of gastro-enterostomy, he said he preferred the posterior operation to the anterior, and he made use of decalcified bone bobbins in this operation, which he performed, to give rest to the stomach. Mr. Robson then went on to describe several cases on which he had operated with success. A discussion followed, in which the paper was subjected to a good deal of adverse criticism.

GLASGOW MEDICO-CHIRURGICAL SOCIETY, *February 4, 1901.*—Professor M'CALL ANDERSON, Dr. LINDSAY STEVEN, and Dr. A. K. CHALMERS introduced a discussion on the treatment of pulmonary tuberculosis among the poor. Professor M'Call Anderson discussed the treatment of phthisis in general, and then proceeded to discuss the treatment of phthisis among the poor. He recommended sea voyages as not being more expensive than residence in a sanatorium. Dr. Lindsay Steven stated that all efforts at relief must be based on the knowledge of the infectious nature of tuberculosis. Dr. Steven indicated two ways in which the treatment of tuberculosis might be accomplished—(1) by State intervention; (2) by private beneficence. He suggested the following as provisions which might be supplied by the State or municipality—(1) means for educating the public as to the true nature of tuberculosis, and the means of prevention; (2) notification (voluntary); (3) provision of sanatoria; (4) provision of homes of rest for dying; (5) provision of means of disinfection. Dr. A. K. Chalmers recommended treatment in sanatoria. The benefit of a sanatorium was that the patient was trained to a different method of life. Mr. MOTION, inspector of poor, gave some information as to the provision made for tuberculous patients in the parochial hospitals about to be built in Glasgow.

GLASGOW PATHOLOGICAL AND CLINICAL SOCIETY, *February 13, 1901.*—Mr. H. E. CLARK in the chair.—Dr. C. WORKMAN showed—(1) A brain from a girl, æt. 6, with tuberculous masses in the cerebellum and in both cerebral hemispheres; (2) three brains, the seat of round-celled sarcomata; (3) a heart presenting enormous dilatation and hypertrophy; (4) aneurysm of aortic arch with hypertrophy of left ventricle; (5) hypertrophy of left ventricle with aneurysm of posterior wall, from fibrous transformation.—Dr. W. K. HUNTER showed microscopical preparations of the blood from a case of splenic leukæmia; the specimens showed polymorphonuclear, mononuclear, and eosinophile cells.—Dr. T. K. MONRO showed—(1) A boy, æt. 12, in whom atrophy of the testicle had followed rheumatic orchitis; (2) a woman, æt. 23, the subject of disseminated sclerosis, presenting loss of the stereognostic sense in the right hand.—Dr. H. RUTHERFURD showed—(1) A rectal dermoid cyst, removed by the parasacral route; (2) a case of double coxa vara, with a skiagram of the hip-joints; (3) sections from a specimen of Wood's subcutaneous tumour, from the neighbourhood of the head of the fibula; (4) a skiagram of a vertical dislocation of the patella, without rupture of quadriceps or of

ligamentum patellæ.—Dr. D. KNOX showed—(1) A girl, æt. 18, in whom there was hypertrophy of the right breast; (2) a brain the seat of a large round-celled sarcoma, involving both hemispheres.—Dr. H. MACLAREN showed—(1) A specimen in which the appendix vermiformis was retrocolic, and was attached by its extremity to the under surface of the right lobe of the liver; (2) a specimen of embolism of the femoral artery, thrombosis of the femoral arteries, and embolism of pulmonary artery, this latter causing death.

FORFARSHIRE MEDICAL ASSOCIATION, *February 7, 1901.*—Dr. C. S. YOUNG, Vice-President, in the chair.—The Society, on the motion of the CHAIRMAN, adopted a motion expressing their sorrow on the death of their beloved and revered Sovereign.—Mr. GREIG then gave an interesting account of his experiences as Civil Surgeon to the Natal Field Force in South Africa. He recounted in detail the methods adopted by that force in the treatment of the wounded on the field, down to their being invalided from the service or returning to duty, and pointed out how their methods differed from those laid down in the regulations. Notes of some interesting cases of the many he had had under his care were given; some were of bullet-wounds, illustrating the wonderful escapes from mortal injury. Notes of cases of shell-wounds, which showed the terrible injuries caused by the shells, and also notes of a few bayonet wounds were also given. A large number of lantern slides were shown at the end of the lecture.

OBITUARY.

LESLIE OGILVIE, M.B., B.Sc.

AFTER a short illness, this widely-known and highly-popular member of the profession succumbed to acute pneumonia on 2nd February. A native of Glasgow, the late Dr. Ogilvie, who was a nephew of Sir Arthur Mitchell, was educated in Edinburgh. He was at first more interested in Natural Science than Practical Medicine, and worked much at Geology with Sir Archibald Geikie. After taking his Science Degree, however, he proceeded to graduate in Medicine, and thereafter his life-work was that of a physician. He was for many years Senior Physician to the Paddington Green Children's Hospital, and Medical Referee to some of the large Scottish Assurance Offices. In both of these capacities he utilised his opportunities for the advancement of knowledge, and produced observations of real value. His many-sided nature, however, could not rest satisfied with purely professional occupation, and in the fields of literature, music, and sport he was recognised as an authority. As Secretary to the Edinburgh University Club of London he was the centre of a very wide circle, and being by nature a man without enemies his loss is mourned by numerous friends.

ANALYTICAL REPORTS.

CEREBOS SALT.

SOME months ago we noticed this preparation, and awarded it very considerable praise. It appears, however, that we were in error in stating that it consisted of chloride of sodium and phosphate of calcium, for the manufacturers have informed us, along with a further sample forwarded, that phosphates of other metallic bodies have a part in its constitution. Thus it appears that, in addition to the phosphate of lime, phosphates of sodium, magnesium, and other metallic bases are incorporated in it, very closely allied in their proportions and characters to those found in whole wheat meal. The presence of these other compounds of phosphoric acid render it all the more valuable as a ready means of introducing the element of phosphorus into the body in as natural a way as possible; but, apart from this, its chief recommendation to our mind lies in the property conferred in it by the presence of the phosphate of lime, of not "caking"; of preventing deliquescence.

As the total quantity of phosphorus which can possibly be taken along with Cerebos Salt, when used at table as a condiment, can never be large enough to exercise much influence upon the organism (although its little may always help to some degree), it can hardly be regarded as a potent phosphoric adjuvant. If, however, it be used also in culinary operations, as suggested by the manufacturers, the intake of phosphorus may reach considerable proportions; and if at meals it be regarded as a useful addition, rather than as a mere accessory, and taken in larger amounts, beneficial results such as are claimed for it may quite rationally be looked for.

Cerebos is certainly a most elegant table preparation of salt, and one which, in suitable circumstances, is the more beneficial the greater the quantity taken in reason.

MONTHLY NOTES ON METEOROLOGY AND VITAL STATISTICS.

By A. LOCKHART GILLESPIE, M.D., F.R.S.E., F.R.C.P.Ed.,
MEMBER SCOTTISH METEOROLOGICAL SOCIETY.

METEOROLOGICAL MEANS FOR THE EAST OF SCOTLAND DISTRICT, FOR THE FOUR
WEEKS ENDING JANUARY 26, 1901; AND FOR THE YEAR FROM JANUARY 1.

	TEMPERATURE.			RAINFALL IN INCHES.		SUNSHINE. HOURS.		Mean Daily Variability of Temperature.
	Mean.	Accumulated Day-Degrees.		Actual.	Accumulated from Jan. 1.	Actual.	Accumulated from Jan. 1.	
		Above 42°.	Below 42°.					
Mean .	37°·0	1* 28°	167°	2 5	2·5	36	36	3°·21
Observed		2 15°	146°	1·9	1·9	22	22	3°·6
Difference	37°·9	1 -13°	- 21°	-0·6	-0·6	-14	-14	+0°·39
	+0°·9	2						

VITAL STATISTICS.

MORTALITY IN FOUR LARGE TOWNS IN THE EAST OF SCOTLAND (EDINBURGH, DUNDEE, ABERDEEN, AND LEITH), DURING JANUARY, AND SINCE JANUARY 1, 1901. Actual Numbers and Rate per 10,000 per annum.

	TOTAL.		CONSTITUTIONAL DISEASES.		CIRCULATORY SYSTEM.		RESPIRATORY SYSTEM.		NERVOUS SYSTEM.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899	1 1292	219·8	222	37·7	123	21·0	299	50·9	141	24·0
Actual Deaths and Rate per 10,000	1 1297	220·6	264	44·8	123	21·0	232	39·4	138	23·5
Difference from Mean	1 +5	+0·8	+42	+7·1	± 0	± 0	-67	-11·5	- 3	-0·5
	2									
	DIOESTIVE SYSTEM.		URINARY SYSTEM.		PNEUMONIA.		PHTHISIS.		CANCER.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899	1 78	13·3	27	4·6	107	18·2	110	18·8	52	8·9
Actual Deaths and Rate per 10,000	1 87	14·8	44	7·4	94	16·0	129	21·9	62	10·6
Difference from Mean	1 +9	+1·5	+17	+2·8	-13	-2·2	+19	+3·1	+10	+1·7
	2									

* NOTE.—The figures¹ denotes the data for January, ² for year to date.

The population of Edinburgh, Dundee, Aberdeen, and Leith, as estimated to the middle of 1901, gives a total of 705,545, or 12,224 above that of 1900, equal to 1.75 per cent. increase.

The mean temperature for the East of Scotland District during January 1901 was nearly a degree above the average; due to absence of any really cold weather rather than to the presence of actual warmth, for the day-degrees of temperature over 42° F. were under, those below it also beneath the average. The rainfall was 24 per cent. under the normal amount, the daily variability of temperature 12 per cent. greater than usual, while out of about 200 possible hours of bright sunshine only 22 were recorded, a decrease of 39 per cent., or little more than three-quarters of an hour *per diem* for the first four weeks of the year.

The total number of deaths exceeded the average by five. The groups of diseases contributing to this were the constitutional, digestive, urinary, phthisis, and cancer. The deaths from urinary diseases were almost 63 per cent. above the average, those from cancer 19.2 per cent. On the other hand, respiratory causes accounted for 22 per cent. fewer fatalities.

Ten deaths were recorded as due directly to influenza during the month.

EDINBURGH MEDICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

LIGHT AND COLOUR PERCEPTION.

By F. W. EDRIDGE-GREEN, M.D., F.R.C.S., *Medical Superintendent,
Hendon Grove Asylum, London.*

I WILL first give a short outline of the theory which I have adopted in order to explain the phenomena of vision. This theory, in addition to being supported by anatomical facts, explains all the extremely complicated phenomena of sight, including those facts which are confessedly incompatible with any other theory. I have assumed that the cones of the retina are insensitive to light, just as, in fact, the optic nerve fibres themselves must be. I regard the cones simply as the terminations of the optic nerve fibres in the retina. I think that it is extremely probable that we shall find that the rods are not connected with the optic nerve fibres, or at any rate in a different manner to the cones. This hypothesis at once disposes of the main objection, which made Kühne say that the visual purple could not be essential to vision, and could not be the visual substance. According to this hypothesis, therefore, light falling upon the retina liberates the visual purple (rose) from the rods, just as heat melts an ointment, and a photograph is formed, the cones conveying the impression of the photograph to the brain. It will be seen, therefore, that the cones are only sensitive to chemical changes in the visual purple, and not to light itself in the sense of conveying any light sensation to the brain. They are sensitive in one way, namely, that when light falls upon them, it causes the inner limbs to contract, but this change has been noted when light falls on the other eye or on the skin. This may be one of the ways by which the visual purple is drawn out; and support is lent to this view by the fact that my experiments on the disappearance of lights can be best made with only one eye, and when no light is allowed to fall on any part of the body with the exception of that which falls on the fovea

centralis. In darkness, therefore, the visual purple is in the rods, and the yellow spot of the retina corresponds to the sensitive plate of a photographic apparatus, which is prepared by light, immediately it is required for use. On waking from sleep in the middle of the night, the field of vision often appears absolutely dark for some seconds, though there may be sufficient light by which to recognise objects. I have noted that just

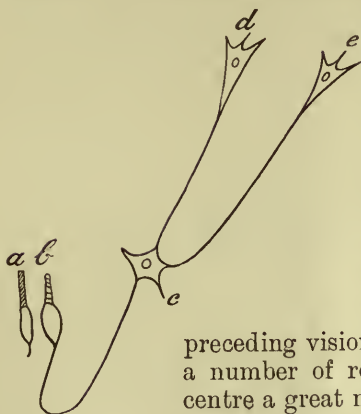


FIG. 1.



FIG. 2.

preceding vision, in the centre of the field appear a number of rose-coloured circles, and round this centre a great number of rose-coloured and green circles, which interlaced and appeared to be rapidly moving, the appearance being very similar to the subjective sensation caused by intermittent light. I have made numerous experiments, which show that light may fall on the fovea centralis without producing any sensation.¹ Fig. 1 shows the retina at rest, the visual purple being in the rods. Fig. 2 shows the retina when light has fallen upon it and in the act of seeing. It is easy to suppose that light acting upon the visual purple effects chemical changes in it, that these chemical changes excite the ends of the cones, and a sensation of light is conveyed to the brain. Fig. 1 shows the connection of a cone of the retina *b*, with a ganglion cell *c*, of the centre for visual

memory; *d* is a cell of the colour-perceiving centre; *e*, a cell of the form-perceiving centre.

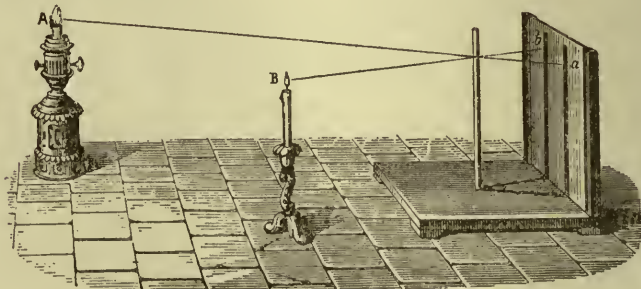


FIG. 3.

It is not at all necessary that we should assume that there are

¹ *Ophth. Rev.*, London, October 1900,

any special substances in the retina, such as the hypothetical substances of the retinal theories of colour vision. It is easy to suppose that light in decomposing the visual purple gives rise to nerve impulses which differ in character (for instance, wave length), just as the physical light waves differ themselves in wave length. A varying degree of acidity would be almost sufficient for our purpose. Therefore, in the impulse itself, we have the physiological basis of light, and in the quality of the impulse the physiological basis of colour. It will be seen from this basis that there is no reason why we should not see an innumerable series of colours. But this is not the case either with the colour or any other perceptive faculty. A very simple experiment will suffice to demonstrate this point (see Fig. 3). Let a equal the light thrown on the screen by the light A, and b that thrown by the light B. The portions of the screen free from shadows receive $a+b$, whilst the shadows receive light from only one source. It is, however, easy to adjust the lights so that one shadow is quite invisible. The same applies to colour.

It will be seen that the nerve cell conveys to the mind information concerning the physical stimuli within the power of perceiving differences possessed by that cell. It is obvious that the psycho-physical theory could be applied in another way; that is, we could assume that the nerve impulses caused by a certain colour differed from other nerve impulses in a different manner from the range of the spectrum; for instance, that yellow and blue differed more than any other two colours. But the facts show that the simplest form of the psycho-physical theory is true—that is, that the nerve impulses differ in accordance with the physical light series.

THE PHYSICAL SERIES OF COLOUR.—It is evident that before we can have a psycho-physical series (that is, a physical series as it appears to the mind), we must have a physical series; and this is admirably represented in the case of colour by the solar spectrum. This is the most perfect example of a physical series which can be obtained. By dispersion, the sun's light is spread out in the form of a series, the wave lengths of the units gradually diminishing from the red to the violet. The presence of gaps in the solar spectrum, in the shape of Fraunhofer's lines, shows that the spectrum is pure, and that the rays of light do not overlap.

The points of greatest difference may be obtained by measurement of the wave lengths. It is evident that the two points of greatest difference do not come within the visual range at all, because the waves in the infra-red present a greater physical contrast to those in the ultra-violet than any two rays in the visible spectrum. If we take the portion of the physical series represented by the spectrum, the two points of greatest physical difference are the first visible ray of red and the last visible ray of violet. The third point of greatest physical differ-

ence will be the centre of the spectrum. The next two points will be found between the third point of difference and the ends of the spectrum. These and subsequent points can be found with the aid of mathematics.

THE PSYCHO-PHYSICAL SERIES OF COLOUR.—When a physical series has been obtained, the mental impression of this series constitutes a psycho-physical series. The appearance of the spectrum to any person constitutes the psycho-physical colour series for that person. The question then is, What is the appearance of the spectrum to the majority of persons? Most persons say that they can see six definite colours in this spectrum—red, orange, yellow, green, blue, and violet; and that one colour appears to shade off into those adjacent to it. We can examine the spectrum in another way—that is, by only observing a small portion at a time, either using shutters to a spectroscope, or letting the spectrum pass through a slit which only allows a small portion to pass. When the spectrum is viewed in this way, it appears to be made up of a series of monochromatic bands. The size of these monochromatic bands differs with different persons; that is, a band which is monochromatic to one person is not necessarily monochromatic to another. These bands are absolutely monochromatic; that is, if a portion of green were taken, the observer could not say which was the yellow and which was the blue side of the portion of light shown. But we know that the portion of light, though apparently monochromatic, contains rays of light which differ very considerably in wave length, therefore we have a number of physical units which cannot be distinguished from each other. These units are seen under the most favourable circumstances for the detection of any difference, the adjacent colours being excluded, and yet they appear alike. The first obvious inference to be drawn from this is, that the rays of light occupying a monochromatic band are identical for the observer, as far as perception is concerned. In the psycho-physical colour series, therefore, the absolute psycho-physical colour units are portions of the spectrum which appear—when the remainder of the spectrum is shut off—monochromatic. For example, take the several varieties of green which we can distinguish. As the band of colour appears monochromatic, we could substitute an equal number of any one of the rays of light entering into its formation, without altering its appearance as far as colour is concerned. From this it is evident that nearly all the experiments which have been made by physicists with regard to colour will have to be looked at from a psycho-physical standpoint, as this is a source of error which appears to have been very generally overlooked. As we can only tell an absolute psycho-physical colour unit from the adjacent units by carefully comparing them, it is evident that the difference between them is not sufficient for practical purposes, so we come to the approximate psycho-physical

colour units—that is to say, colours which can be easily distinguished from each other without comparison.

These approximate psycho-physical units, for a normal-sighted person, are six in number—red, orange, yellow, green, blue, and violet.

Fig. 4 represents a spectrum as seen by a normal-sighted person. A and B represents the centre points of approximate psycho-physical units, green and blue; that is, colours corresponding to these portions of the spectrum would be easily distinguished without comparison. The rays included between A and C form an absolute psycho-physical unit; that is, the portion included between A and C appears monochromatic. If shutters were used to the eyepiece of the spectroscope, the observer would not be able to say which was the yellow and which was the blue side of the portion of light shown. If, however, he were shown the coloured band from A to D, he would be able to distinguish between the colour at A and B and that at D. But if he were shown a colour corresponding to D, and were asked to which

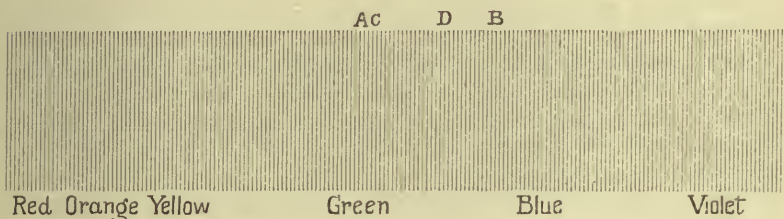


FIG. 4.

portion of the spectrum it corresponded, without being allowed to compare it with other colours, he would find great difficulty in indicating the right position. There are therefore six definite points of difference in the spectrum to a normal-sighted observer, corresponding to the centre of each of the colours—red, orange, yellow, green, blue, and violet. As each of the colours at these points must, by the presence of the adjacent points, blend with each other, we have the approximate psycho-physical units formed. It will be seen that if the size of the absolute psycho-physical units, as AC, be increased, the size of the approximate units will also be increased. As the spectrum remains the same length, the increase in size of the approximate units results in their re-arrangement and diminution in number, and hence colour-blindness; five instead of six distinct points are seen in the spectrum. In the next degree four, and so on, until total colour-blindness is reached.

THEORIES OF COLOUR PERCEPTION.—I will now review a certain number of the well-known facts of colour vision, and show the

inferences which may be drawn from each set of facts, each inference and deduction being limited as much as possible by other known facts and deductions. In constructing a theory, if any facts be absolutely inconsistent with the theory, the theory should be rejected, no matter how plausibly other facts are explained by it.

1. *Colour mixing*.—If we take certain proportions of spectral red, green, and violet, we can make white light or any other colour. If we stopped at this point, we could deduce, as Helmholtz has done, that there were three primary colour sensations, in which case the curves constructed by him admirably represent the theoretical position. But we can equally deduce from these facts that red, green, and violet are the primary points of difference perceived by the colour-perceiving centre, and that the mixture of spectral colours only gives rise to the perception of subsidiary points of difference within the power of perceiving differences possessed by that centre. Let us therefore see whether the curves are intrinsically correct, judged only by the other known facts of colour-mixing.

The first important fact is, that there are many colour-blind persons who will make exactly the same matches, as far as shade is concerned, as the normal-sighted, therefore colour-blindness cannot be due to the absence of a hypothetical set of colour-perceiving fibres, though this is how it is represented in many books. Helmholtz at once saw the force of this argument, and suggested that instead of the colour-perceiving fibres being absent, they responded to light in the same way as one of the other sets of fibres. But this hypothesis does not surmount the difficulty with reference to the perception of shade, because it seems incomprehensible that, when the hypothetical red fibres were acted upon by green light in the same way as the green fibres, the perception of luminosity should be the same as the normal-sighted. Rood has shown that the luminosity curves for the normal-sighted differ. I regard all luminosity curves as only giving information as to the action of light on the visual substance, and not as affording any information with regard to the perception of colour. The colour-blindness of the peripheral parts of the retina, and the fact that this disappears with brighter colours, while white does not change its colour, has to be explained. We have also to account for the well-known fact that normal-sighted persons may be made colour-blind, and colour-blind persons made to see like the normal-sighted, by hypnotism. It would be impossible to replace a missing set of fibres, but it is very easy to understand how an ill-developed perceptive centre might, under a condition of excitement, recognise differences in the same way as a better developed centre under normal conditions, just as a normal-sighted person can recognise spectral colours with the peripheral parts of his retina.

Though I do not believe that colour vision is trichromic, in

the sense used by the physicists—that is to say, that there are three definite fundamental sensations which are capable of acting independently of each other—it is easy to give a simple explanation of the apparent trichromatism which exists. There are two elements of trichromatism which exist, which may act independently or in association with each other. One is in the brain, and the other in the retina. The one in the brain is that red, green, and violet are the three primary points of difference; and that for the retina, the fact that visual purple and its complementary pure green may be divided theoretically into three parts, that is, orange, or red and violet, or blue, the constituents of purple (rose) and green. In the latter case, it will be noticed that green must have a value equal to the other two constituents, which, as a matter of fact, as shown by the colour-mixing equations, it has. But even had the experiments been consistent with the three-fibre hypothesis, this would not prove the truth of the theory, which would have to be rejected as totally inconsistent with other facts. Many natural phenomena can be explained in various ways, but in order to arrive at a true conclusion we must make crucial experiments, which point in which direction the truth lies.

There are many more facts of colour-mixing which are quite incompatible with the three fundamental sensations. For instance, orange and violet make dark rose, not red; and blue and red make rose, not violet. It now remains for me to explain how the facts of colour-mixing may be interpreted by the psycho-physical theory. This will, however, be clearer after the reader has read the portion of the article on colour-blindness. According to the psycho-physical theory, any person can only see a certain number of colours. In trichromic cases the space between red and green is seen as red-green, but as the colour sense became further developed a new colour, yellow, was seen, and so a mixture of red and green could only give rise, in the normal-sighted, to a sensation of yellow, the colour which had replaced the red-green of an anterior state of development. I shall not again allude to the trichromic theory, as the objections I have raised to it and other theories have never been answered; but I wished, in the above few remarks, to show that the theory was not even in perfect accordance with the primary facts on which it was based. This is very evident on comparing the sets of curves by any two observers; the difference between them is very marked.

2. *Some peculiarities of the yellow spot of the retina.*—The peculiarities of the yellow spot, even those mentioned by Helmholtz, in the first and second editions of his "Physiological Optics," appear to be very little known. I have already mentioned the fact that light may fall on the fovea centralis without producing any sensation. A very simple experiment will convince the reader.

(1) If we look at two small isolated stars of equal magnitude, either may be made to disappear by looking fixedly at it, whilst the other remains conspicuously visible. I found that the phenomenon was most marked on a dark night, and when the star looked at was in a portion of the sky comparatively free from other stars, when only one eye was used. On a very dark night, a considerable number of small stars occupying the centre of the field of vision may be made to disappear, whilst stars occupying other areas of the field of vision are plainly visible. (2) Other lights or objects, when small and with dark surroundings—as, for instance, a piece of white cardboard on black velvet—may be made to disappear in a similar manner. (3) No change can be observed if a very bright light, a group of stars, or a uniformly illuminated surface, be made the object of the experiment. (4) If we look at an illuminated object through a pin-hole in a piece of black cardboard, surrounded by black velvet, we find that, unless it be very bright, it will not be visible at all. On moving the eye, so that the image does not fall on the centre of the retina, the object appears brighter.

When these experiments are made with a lantern, the result is very startling. One moment we are looking at a bright light, and the next have the sensation of having become quite blind, the sensation of absolute blackness being greater than can be obtained in any other way. Just before the light disappears, it appears to pulsate, appearing and disappearing as if a rose diaphragm were shut and opened before it, except that the reappearance of the light is always from without inwards. The same appearance may be seen with the stars on a dark night. I have made a great number of experiments in order to find out which colour disappears quickest, but these experiments require special apparatus. The chief essentials in making a bright light disappear are to use only one eye, and to have the surroundings of the light absolutely dark. In my experiments which I make at night I use a specially constructed lantern, which I view through four open doors, so that all extraneous light can be as far as possible excluded. The practical importance of these experiments is obvious, as a sailor, on looking at a supposed light, and seeing nothing there, might think he was mistaken, and so an accident might arise. These facts ought to be generally known to seafaring men.

It is not generally known, though Helmholtz mentions the fact, and also states that it is quite unexplainable, that a perceptible interval elapses before we are able to see with the yellow spot. When once the fact has been noted, it is very easy to see the phenomenon under almost all circumstances; but in order to see it best, one eye should be used, and the surface looked at should not be too brightly illuminated. On opening the eye quickly, the portion of the field of vision corresponding

to the macula will be seen as an oval black spot, and light will appear to invade it from without inwards, the fovea centralis being the last point to convey a sensation of light. This experiment demonstrates the diffusion into the yellow spot of the visual substance. It may also be noted that, on shutting the eyes, vision is most persistent at the fovea centralis, just as we should theoretically expect, as it would take longer for the visual purple to return to the rods from the fovea.

I have made many experiments with a perimeter, in order to ascertain at which point of the retina a piece of paper, painted with luminous paint, appeared brightest. I found the connected points made an oval figure, the smaller diameter of which occupied the vertical direction, and was 10° on either side of the point of fixation. The long diameter was in a horizontal direction, and occupied a position from 15° to 20° on either side of the point of fixation.

There are many other phenomena connected with the yellow spot, and which equally support the theory. For instance, under intermittent light the yellow spot appears as a black patch, with a purple substance moving rapidly towards it from adjacent parts. If we look at a bright light reflected from metal, so that there is darkness on one side and light on the other, on the light side there appear to be innumerable little purple rivers, which seem to be moving rapidly towards the central spot. The purple appears to move in minute spots, and the space between them appears green.

3. *After-images*.—After-images may be divided into positive and negative. Positive after-images are those in which the bright parts of the objects seen appear bright in the after-image, the reverse being the case in negative after-images. The first important fact to be noted in regard to after-images is that positive after-images are favoured by darkness and negative after-images by light. This fact can be easily verified, and is of the greatest importance in the study of the subject. The colour of a positive after-image varies according to the duration and intensity of the primary stimulus. If this is very short, and the light moderate, we have a momentary glimpse of a purplish white light, which rapidly fades away from without inwards. If the duration of the stimulus be rather longer, and particularly if the eyes have been first kept closed, and afterwards are shut and covered by the hands, a dull purple is seen, which increases in intensity up to a certain point, and then fades away from without inwards, without changing colour or becoming negative. The same purple after-image is seen after every spectral colour and white light. It is most difficult to obtain after spectral red. If the duration of the primary stimulus be slightly longer, a well-defined yellow after-image is seen, which instantly changes to purple, which then passes through the same changes as before. The yellow after-

image is very well defined and the purple after-image is ill defined, but both are positive. If the duration of the primary stimulus be slightly longer and the light bright, as for instance the film of an incandescent electric light, the positive purple after-image will be surrounded by a halo of its complementary, namely, pure green.

The phenomena of contrasts are explained on the view that, colour being a point of difference, this becomes more marked on comparison, the perceptive centre being in the most favourable position for the detection of any difference. If we contrast a yellow with a greenish yellow, the yellow inclines to orange, and the greenish yellow to yellowish green. This could not be explained by assuming that the colours differ by the addition of the complementary to each, as the complementary of yellow is blue, and this mixed with yellow would make white instead of orange-yellow.

There is one fact which is more quoted than any other as evidence of definite substances in the retina representing fundamental sensations, that is, that after looking at blue-green the red of the spectrum appears a more saturated red than when seen under ordinary circumstances. But the same occurs with all physiological sensations, and no theory of fundamental sensations has been applied to these. For instance, warm water feels warmer if we have had our hands previously in cold water, and if one hand be put in cold water and the other in hot, and then both are plunged into lukewarm water, the water feels hot to the one hand and cold to the other. A sweet substance tastes much sweeter if we have previously tasted a sour liquid. A high note is positively disagreeable in its shrillness if the previous part of the tune has been played in the bass. These facts are only evidence of the fatigue which takes place in all parts of the nervous system, and which gives rise to a false standard of comparison. I am glad to be able to say that the number of those who believe in definite retinal substances corresponding to different colours, diminishes every day.

Space will not permit me to go further into the domain of physiological optics, especially as the explanation is in most cases obvious. For instance, adaptation of the retina corresponds to the accumulation of the visual purple, in addition to the fact that all the structures become more sensitive. The variation in the luminosity curve with light of different intensity is similar to that found with other photo-chemical substances. The perception of light of low luminosity being seen as white is what we should expect, the cerebral cells not being able to perceive any difference between the feeble stimuli. It will be noticed that we have disorders corresponding to defects in each part of the apparatus, as night-blindness, day-blindness, central scotoma, defects of colour perception without defects of form perception, etc.

The colour-blind may be divided into two distinct classes, which are independent of each other.

The first class includes those who are not able to see certain rays of the spectrum. There are two subdivisions of this class of colour-blind persons—

1. Those who are found to have the red end of the spectrum shortened.

2. Those who have the violet end of the spectrum shortened.

Persons belonging to the first subdivision are not able to recognise a red light at a distance as easily as the normal-sighted, and in extreme cases it is not visible at all.

The shortened portion of the spectrum is indistinguishable from black ; that is to say, not only is the red or violet not perceived as a colour, but it is not seen at all.

It now remains to consider the influence of a shortened spectrum upon colour vision. The first evident fact is, that bodies reflecting light, the rays of which occupy the shortened portion of the spectrum only, appear black.

A very common mistake, due to shortening of the red end of the spectrum, is the confusion of pink and blue. If a person with considerable shortening of the red end of the spectrum is shown a pink which is made up of a mixture of red and violet, the red consisting of rays occupying the extreme left of the spectrum, only the violet is visible to him, and so the pink appears as a violet without a trace of red. This pink is therefore matched with a violet or blue very much darker than itself.

Mistakes which are due to shortening of the spectrum may be remedied if we subtract the rays occupying the shortened portion from the colour of confusion. For instance, if we take a blue and a pink which have been put together as identical by a person with a shortened red end of the spectrum, and look at them through a glass which is opaque to the red but transparent to the remaining rays of the spectrum, both will appear alike in hue and shade.

A person with considerable shortening of the red end of the spectrum will look at a red light (which is so dazzlingly bright to a normal-sighted person as to make his eyes ache after looking at it closely for a few seconds) at a distance of a few inches, and remark that there is nothing visible, and that the whole is absolutely black. It is obvious that the light must only consist of rays occupying the shortened portion of the spectrum.

I have constructed a test for this class of the colour-blind, which consists of a lantern, with slides containing smoked glass, which, like a mist or fog, is most transparent to the red rays at the extreme left of the spectrum. By means of these glasses we can show a red composed of rays from the terminal portion of the spectrum ; if the observer fail to see this light, we know that the

red end of his spectrum must be shortened, and that he is unfit for the duties in which it is necessary to recognise a red light at a distance.

The strongest objection to the use of a wool test only, is that a person may, through shortening of the spectrum, be unable to distinguish red from black and yet be able to pass the test with ease, as it is obvious that this will not prevent him from matching a light green wool with other green wools.

The second class of the colour-blind make mistakes, not because they cannot see any colour, but because they are not able to perceive the difference between the colours which is perfectly evident to normal-sighted persons.

Both these classes are represented by analogous conditions in the perception of sounds. The first class of the colour-blind are represented by those who are unable to hear very high or very low notes; that is to say, these notes are non-existent to them. The second class are represented by those who possess what is commonly called a defective musical ear. A person with a defective musical ear is not able to say when a violin is in tune with a piano, though he can clearly hear the sounds produced by both instruments. He may recognise the difference between the two when the violin is a tone sharper or flatter than the piano, but not when the interval is only half a tone. In extreme cases no difference is perceived between very high and very low notes.

The same thing is found with regard to the perception of colour. Normal-sighted persons see six distinct colours in the solar spectrum. These are red, orange, yellow, green, blue, and violet. All other colours are plainly modifications of these six, for instance, yellow-green, blue-green, etc.

Those who have a very acute perception of colour can see seven distinct colours or points of difference in the spectrum. The seventh colour is seen between the blue and the violet.

In the first degree of colour-blindness, five instead of six distinct colours are seen, orange having disappeared as a definite colour. In the next degree only four colours are seen, blue having disappeared as a definite colour. Yellow next disappears, three colours being seen. In the next degree only two colours are seen, green having disappeared. With increasing colour-blindness, less and less difference is seen between any part of the spectrum, until only the ends are recognised as being different in colour. Finally, no difference in colour is seen between any part of the spectrum.

I have classified this class of the colour-blind in accordance with the number of colours which they see in the spectrum, but I have not relied upon this examination alone, but confirmed it by other tests; for instance, I have found that a person who could see four colours in the spectrum would classify two hundred

pieces of coloured material or skeins of wool as if he saw four colours, and never making mistakes between these four.

An examination with the spectrum, therefore, gives us a complete key to the mistakes made by the colour-blind.

Those who see five colours make the following mistakes :— They always find a difficulty with orange, rarely using the word, and regarding it as a superfluous term. By artificial light they confuse orange with reds, pinks, and browns. They do not see the slight differences between colours which are evident to the normal-sighted. Thus they are rarely able to say, without comparison, whether a certain green is a pure green, or has a shade of blue in it, to use a common expression. In the same way, they confuse crimson and scarlet, and deep purple-violet with violet. They never make mistakes between the colours corresponding to the five points in the spectrum, which they distinguish as different.

In this subdivision, like those which follow, the defect in colour perception is not limited to one part of the spectrum; the colour sense seems to be diminished as a whole.

Those who see four colours in the spectrum make all the mistakes made by those who see five colours, but in a more marked degree. In addition, they do not recognise blue as a definite colour; when told to classify a number of coloured objects, they put the blues with green or violet.

Colour is to them a feeble quality of objects, but they never confuse the four colours (red, yellow, green, and violet) which they have distinguished in the spectrum.

Those who see three colours in the spectrum (red, green, and violet) make all the mistakes made by those who see four colours, and, in addition, do not recognise yellow as a colour, but put it with green or red. They can always distinguish between the three colours they saw in the spectrum.

Those who see only two colours in the spectrum confuse red, orange, yellow, and green on the one hand, and blue-green, blue, and violet on the other. Colours corresponding to the neutral point, and equal mixtures of colours belonging to both sets, are mistaken for grey.

In cases in which shortening of the spectrum is associated with a diminution of the colours seen, the position of the colours is altered. For instance, a person seeing two colours in the spectrum has the position of the neutral point nearer the violet when the red end is shortened, and nearer the red when the violet end is shortened, than in cases in which the spectrum is of the normal length.

The following are the details of a trichromic case of colour-blindness :—

J. C., a man, æt. 33, saw three colours in a bright solar spectrum—red, green, and violet. The orange and yellow, he saw, not as definite

colours, but as mixtures of red and green. In the same way he regarded blue as a mixture of green and violet. There was no shortening of either end of the spectrum.

The following is a classification of the wools, silks, cards, and glasses of my classification test. The name at the commencement of each group was the colour-epithet applied by him.

Violet.—Violet, purple, blue-grey, blue, and one blue-green card.

Blue.—Green and blue.

Green.—Green, blue, brown, and yellow.

Yellow.—Yellow, orange, greenish yellow, and yellow-green.

Pink.—Pink and purple.

Light red.—Orange, red, pink, and rose.

Red.—Red, rose, orange, and yellow-brown.

Light brown.—Brown, grey, light green, and buff.

Not named.—Grey, brown, and black.

In making this classification, it was with great difficulty that I persuaded him to name the groups which he has designated as blue, yellow, and light brown, though he named the other groups readily enough.

Tested with my lantern test.—Called yellow "light red"; standard green, "blue"; purple, "violet"; and blue, "violet." (Rejected.) Named pure green, all neutrals, ground glass, ribbed glass, and both reds correctly.

Passed Holmgren's test without touching a confusion colour.

Read Stilling's coloured letters.

Red and blue (20 ft. being normal), at 33 ft. 9 in.

Green (20 ft. being normal), at 38 ft. 2 in.

Yellow (20 ft. being normal), at 42 ft.

The examination with the spectrum gave a key to his colour-perception.—He was never in doubt about red, green, and violet, and always named these colours correctly. Blue, yellow, and orange, he said, ought not to have names, and he was very uncertain about them. His manner when classifying these colours was very characteristic of the indecision he felt regarding them. He would take a blue and put it with the violets, then move it away and put it with the greens. Finally, he put it in another class which contained as many greens as blues.

A man with this colour-perception would be unsafe at sea, because he would be unable to distinguish the front light from the side lights. This is shown by the lantern test. A very interesting point in this case is, that he had a much more marked sense for light of all colours than most normal-sighted. He was able to read Stilling's yellow letters on a black ground at more than twice the normal distance. It is evident, therefore, that quantitative tests which assume that the colour-blind are short-sighted for colours would be useless to apply to a case of this kind.

In a paper in the *Lancet*,¹ I have pointed out the defects of the physical methods of endeavouring to ascertain the colour

sensations of a colour-blind person by measuring the luminosity of the colours he sees. The facts obtained by measuring these colours are very easy to interpret. For instance, it has been shown that the luminosity curve of a totally colour-blind individual, suffering from day-blindness, had a similar shape to the normal curve for light of low luminosity. But this is exactly what we should expect; that is, that a powerful stimulant had the same effect on the defective retina as a feeble stimulus has on a normal-sighted person.

I have, as far as possible, avoided the facts which I have already dealt with in my book on colour-blindness,¹ and paid special attention to those facts which are either crucial in their character, or which present some special points of difficulty. I have not found it necessary to vary my theory in the smallest particular.²

All the facts which can be gained from the study of museums and literature point to the view that the sense of light was developed first, and then the sense of colour, those waves which differ from each other most, physically, being first perceived as different, namely, red and violet. It is obvious that if a certain portion of the visual centre be set apart for the perception of colour, when it was very small and ill developed, it would only be able to perceive differences of considerable magnitude, but as more cells were added to the centre, greater and greater power of perceiving differences arose. Many facts show that the fovea and yellow spot are more effectively represented in the cortex than the peripheral parts of the retina. This would explain the partial colour-blindness of the peripheral parts of the retina, especially as very bright colours are recognised. Each nerve cell might at first have been connected with many optic nerve fibres, and the number gradually diminished as evolution proceeded. Then all the degrees of colour-blindness were passed through, until the present stage of the development of the colour sense was reached. These facts show that colour-blindness is only an example of an earlier state in the development of the colour-perceiving centre.

¹ "Colour Blindness and Colour Perception," Internat. Sc. Ser.

² "Memory and its Cultivation," *ibid.*

ON THE FORMATION OF CRYSTALS, DENDRITES, AND SPIRAL STRUCTURES, IN RELATION TO GROWTH AND MOVEMENT, ESPECIALLY RHYTHMIC MOVEMENTS.

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(Concluded from page 222.)

ANALOGOUS in many respects to the protoplasm of Huxley is the bioplasm of Beale. This, as its name implies, is also an elementary life stuff. It is undifferentiated, and in this respect is identical with Huxley's protoplasm. Beale and Huxley differ as to the mode of production of their elementary life-stuffs. Beale affirms that they are the product of the *vital* forces *per se*; Huxley of the *physical* ones. Beale attributes all organisation to life, as apart from chemical, physical, and other forces. According to him, the bioplasm or germinal matter is the same always and everywhere, and consists of small masses of a structureless, colourless, and transparent viscid substance. Beale claims for his bioplasm or life matter similar properties to that claimed by Huxley for his protoplasm. To both the same objections apply. Beale grounds the homogeneity and identity of his bioplasm on microscopical research, and Huxley, as explained, upon ultimate chemical analysis. Neither, however, is trustworthy. Experience teaches us that the microscope is limited in its powers, and that chemical analysis, instead of simply disintegrating and breaking up a body into its ultimate elements, not unfrequently produces new combinations, and consequently new substances. On carefully reconsidering this matter, I am disposed to believe that both Huxley and Beale are in error, and that protoplasm is not the product of either the physical or the vital forces *per se*, but of both combined.

The grand fact remains, that the germs and seeds of plants and the eggs of animals, apparently homogeneous and identical, invariably produce not only their own kind, but, during the process of evolution, substances which are altogether dissimilar. Even man himself, with his wealth of imagination and thought, is the product of an egg, which to the eye of the microscopist and chemist is, as to its several parts, homogeneous and identical. Yet this egg, with its several portions placed in exactly the same conditions, produces the tender pulp of the brain, the flaccid muscles, the tough tendons, the elastic cartilages, the hard bones, the still harder teeth, the enamel, a substance nearly as brittle as glass, and in due time the several secretions, the major portion of which is composed of water. To these are to be added the external skin,

with its hair, nails, etc.; the internal skin or mucous membrane, with its numerous glands; the secreting and excreting organs; the nerves; the lymphatics; and the blood vessels, with their contained blood, so rich, so complex, so marvellous in composition. These various products, so diverse in form, composition, and function, are, we know, the product of an egg. Shall we be told, or, if told, shall we believe, that this egg is homogeneous and identical in all its parts and particles? Identical these parts may be to the eye of sense, but to the eye of reason they are not so. Matter similarly constituted, similarly disposed, and similarly conditioned—*i.e.* placed under precisely similar circumstances—behaves in precisely the same manner; in other words, all the parts are influenced alike. If life had to operate on absolutely identical matter, the living mass would be simply homogeneous—*i.e.* undifferentiated; and if undifferentiated, it would have no power either to build up a plant or an animal. It is impossible to produce muscle, bone, brain, etc., from matter identical in ultimate composition. In the germ, the seed, the egg, even from the first, there is differentiation. The first embryonic changes are the result of this differentiation. It is this which enables the different parts of the embryo to attract and assimilate different substances and to build up different textures. One embryonic change involves another, and gradually the individual is evolved, each according to its kind. The weaver may not produce a web dissimilar in texture and pattern in the absence of dissimilar elements. He must be supplied with the warp, the woof, and the varied pigment. A queen-bee may be formed from an ordinary bee grub by changing the quantity and quality of its food, but no amount of change of diet can produce from the same grub a dragon-fly or a locust.

In making these statements regarding the non-identity of protoplasm, bioplasm, and the several parts of the germ, seed, or egg, I do not mean to affirm that all the tissues enumerated are contained in the original germ, seed, or egg. Only this: that the original germ, seed, or egg is differentiated sufficiently to inaugurate the first series of changes, and that these inaugurate others in constant and rapid succession, until the plant or animal is completed. The first series of changes provides the materials and forces for the second, the second for the third, and so on, according to the degree of differentiation required in each particular organism. It is initial force and matter that are primarily required. Granted these, development in specific directions proceeds as a matter of course.

Chemistry and physics are not the whole of physiology. These sciences can conjure up an automaton, but are absolutely powerless when an ovum is desired. Dumas, a leading authority in modern chemistry, thus limits its province:—"The chemist has never manufactured anything which, near or distant, was

susceptible even of the appearance of life. Everything he has made in his laboratory belongs to 'brut' matter; as soon as he approaches life and organisation, he is powerless. . . . Organised matter, not capable of being crystallised, but destructible by heat, the only matter which lives or has ever lived—this matter, a subordinating agent of the vegetating power in plants, of the motion and sensation of animals, cannot be produced by chemistry; heat does not give birth to it; light continues to engender it under the influence of living bodies."¹

The pretensions of the physicist may be disposed of even more cavalierly.

No machine hitherto devised by human ingenuity at all resembles or can compare in efficiency with a living organism, when the consumption of material and the amount of work done are taken as the standard of comparison. A man is as far in advance of a steam-engine in this respect as day and light are of night and darkness.² If, then, neither the chemist nor physicist, nor both combined, can produce a living organism or anything even remotely resembling it, we are forced to fall back upon other than the chemical and physical forces, and the only ones we can under the circumstances fall back upon are the vital ones.

In order to fully explain some of the more tangible, outstanding, and salient features which obtain between the inorganic and organic kingdoms, and which they have in common, it will be necessary at this stage to refer very briefly to solar heat, winds, vortices, and nebular arrangements, in their relations to growth, development, and organic movement; and especially to the dendritic and spiral structures, and movements which everywhere prevail in the organic kingdom.

The subject of organic growth, development, and movement has many side-lights thrown upon it by a consideration of what may be regarded as inorganic growth, development, and movement, namely, the arborescent frost pictures, as they appear on window-panes and pavements in winter, the branching dendrites formed in minerals and metals, and similar dendritic displays made by lightning (revealed by instantaneous photography), and when it strikes and scorches the human skin.

I have already shown that the organic and inorganic kingdoms interact at every point; I have still to demonstrate that the distribution and movements of atoms and molecules in the physical universe bear a remarkable analogy to their distribution and movements in living plants and animals.

The sun is the great giver of heat and light, and on its presence

¹ Faraday Lecture.

² Rumford long ago showed that a much greater quantity of work could be performed by a horse than could be performed by its food, when employed as fuel in a steam-engine.

the life of plants and animals practically depends. The sun, as far as our planet is concerned, is fixed, but as the earth rotates upon its own axis every twenty-four hours, and revolves round the sun every 365 days, it follows that the alternations of day and night, and the seasons—spring, summer, autumn, and winter—so indispensable to the health and well-being of plants and animals—are infallibly secured. The sun is directly connected with the production of winds, as these largely depend on changes of temperature in certain localities, on the rarefaction and condensation of the air, irregular atmospheric pressure, vacua or partial vacua, the presence or absence of moisture, etc.

Winds are useful in carrying and diffusing heat and moisture, and in purifying the air which plants and animals breathe. They occasionally blow in straight lines, but for the most part in curves, circles, and spirals. The cyclone, one of the most powerful and violent of winds, pursues a circular path. When, however, it advances rapidly it follows a rotatory, spiral course.¹

The peculiar circular and spiral movements of the wind are well seen in certain sand-storms. In various regions of the earth; more especially in warm climates, the sand is raised by the action of the wind in spiral eddies, which take an upward direction, and form a more or less dense column of sand, having a vertical measurement of anything up to a hundred or more feet. The column is distinctly spiral in its configuration, and spreads out at its summit, when the sand-storm ceases. Occasionally a large number of spiral columns may be seen at the same time, arranged in a circle.

Vortices occur on sea, on land, and in the heavens. At sea, and in great fresh-water lakes and rivers, they take the form of eddies, maelstroms, and spiral water-spouts; on land they are seen as whirlwinds of sand, leaves, straws, and other light substances. In the heavens the nebulae are, in certain cases, arranged in great vortices, single and double.

¹ “It appears from recent investigations, that hurricanes, tornadoes, and typhoons are to be regarded as great whirlwinds in motion, the meeting of two opposite winds producing the whirlwind. According to M. Dove, the rotatory motion of the air is from right to left in the northern hemisphere, or in the direction *opposite* to the hands of a watch; from left to right in the southern hemisphere, or *with* the hands of a watch; gusts and lulls occurring in the vortices. It is further ascertained that the northern hurricanes travel in an oblique direction from the equator towards the north pole, while the southern hurricanes travel more obliquely from the equator towards the south pole. We frequently observe in serene hot weather the whirling motion of the air, betrayed by sand and dust ascending in spiral columns. Larger and stronger whirls carry up leaves and straws, and even buildings lying in their course. These whirlwinds are generally caused by the struggle of two winds meeting at an angle, in the same manner that eddies and whirlpools are formed in water, by two currents being obliquely impelled against each other.”

There is reason to believe that whirlpools in water, and also in air, may take place without the intervention of two opposing currents meeting each other obliquely. An artificial whirlpool is readily produced by placing water in a circular hand basin with a plug at the bottom. If the plug be withdrawn, the water, in its attempt to escape, invariably forms a tiny eddy or whirlpool.

The water-spout provides one of the most wonderful displays of spiral molecular action in nature. The spiral is generally single. The water-spout consists of a huge, vertical, spiral mass of watery vapour, sometimes stationary, and sometimes spirally moving along the surface of the water (sea, lake, or river). It descends from the clouds, or rises from the water, in gigantic spiral wreaths, and forms a vertical spiral column from 800 to 2500 feet high; the column is also of a sand-glass shape, *i.e.* it spreads out above and below, and is comparatively narrow in the middle.¹ The effect is to draw up immense masses of water into the clouds, the clouds driven by winds carrying the moisture which they contain to large areas of the earth's surface, on which it is ultimately deposited as rain, sleet, hail, or snow.

The surcharged clouds are the great irrigators of the land, and wherever rains are plentiful, plants and foliage are abundant and luxurious. The abundance of plant life in turn secures a plethora of animal life; plants, in the great majority of cases, supplying the food of animals; and animals thriving and multiplying in proportion as forage, succulent grasses, leaves, vegetables, and fruits abound.

The order of creation is briefly as follows:—The physical universe was first formed, then plants, then animals. Plants and animals could not exist as apart from the physical universe. The materials and forces of the physical universe not only enter into the composition of plants and animals, they also provide them with food. "Brut" matter forms the food of plants; and plants, for the most part, that of animals. The *Carnivora* and *Omnivora* feed upon animals and upon plants, directly or indirectly. The physical universe is, in a sense, the great primeval parent, and provides a bountiful table and a home for plants and animals alike.

¹ The water-spout is variously described. According to one authority ("Descriptive Atlas," by Milner), "whirlwinds usually form a double cone; the upper cone with the vortex inclining downwards, while the point of the lower cone is directed upwards. In passing over the sea, lakes, and rivers, the water is raised by the lower cone in a spiral column, often to the height of several hundred feet, while the clouds are brought down by the upper cone, and a water-spout is formed. Two cones have frequently been observed to separate and re-unite; and in the Mediterranean as many as sixteen water-spouts have been seen at the same time. In water-spouts on land the upper cone consists of a mass of clouds, and the lower cone of sand, dust, and other bodies found on land. Deluges of rain accompany their disruption."

According to another authority ("Century Dictionary," edited by Dr. W. Dwight Whitney), "the water-spout is a whirlwind over a body of water, which produces the appearance of a solid column of water, extending from the surface to the clouds. In reality, however, the phenomenon that is seen is the cloud brought down to the earth's surface by the rapid gyratory motion of a vertical whirl, and it consists simply of fine mist surrounding a central axis of rarefaction. At first the cloud has the form of a tapering funnel; then, descending to near the water's surface, it draws up the water for a distance into its vortex, and imparts to it its whirling motion. The spout is then complete, and appears as an immense column connecting sea and cloud, light in colour near the centre, but dark along its sides. Like other whirlwinds, the water-spout has a progressive as well as a rotatory motion, its axis sometimes being inclined forward in the direction of advance. . . . It is common for a number of water-spouts to be seen simultaneously or successively."

All living things come from the physical universe and return to it. The subtle element of life borrows from the physical universe, for a longer or shorter period, the materials which it converts into plants and animals; but sooner or later it returns them, in their original or in a modified form, and in undiminished quantity.

The restoration or day of reckoning occurs at death; and I can conceive no more striking picture, no more convincing illustration of the tremendous gulf between living and dead matter, than is furnished by living and dead plants and animals respectively.

The stillness of death, as contrasted with the ceaseless activities of life, produces a profound impression on even the most careless and thoughtless observer. The living and dead thing are as the poles asunder. Dead once, dead always. No power on earth can resuscitate a dead plant or a dead animal. Similarly, only a living thing can beget a living thing. No fortuitous assemblage of dead parts can, under any possible circumstances, assume life *de novo*. Spontaneous generation, even more than the philosopher's stone, is the illusory figment of the imagination.

I am not called upon here to discuss the great modern theory of evolution. That can be done elsewhere and at another time. It is enough for my present purpose to be able to state that plants and animals, in endless succession, have come down from the earliest historic times, and are, so far as we can make out, very little changed. Man himself has undergone no radical modification for 5000 years at least, and some anthropologists and geologists refer his appearance on the earth to an inconceivably early period—a period which the mind has difficulty in grasping.

That modifications have taken place in the organic and inorganic kingdoms, in the fulness of time, no one will doubt; but the grand fact remains, that living plants and animals are the direct products of ancestors, *i.e.* of living plants and living animals; and that the offsprings, in every instance, resemble their parents and prototypes.

No one has ever seen the birth of a new plant or animal, and it goes without saying that if thousands of years are required to manufacture a new genus, and, it may be, even a new species, the proofs of the said manufacture are necessarily absent. The subject is straightway removed from the category of things about which the human mind can reason. The matter logically becomes a *petitio principii*. Endless modifications through endless time are required and claimed for evolution, but these conditions, as indicated, remove it from human experience, and, to a large extent, even from human history.

The modifications in the organic and inorganic kingdoms are no doubt very slow, gentle, and minute, but they are not such as to break down the great and well-defined boundaries between the several orders of plants, and the several orders of animals. Cultivated plants and animals, if left to themselves, revert to their

original types, and the progeny of allied animals, crossed in breeding, become, as a rule, barren.

The modifications in question, moreover, occur simultaneously in the inorganic and organic kingdoms, so that there is no dislocation of the great scheme of the universe, whereby, as I have endeavoured to show, the inorganic kingdom becomes at once the foster-parent, the storehouse, and the grave of everything that lives—plant and animal alike.

There is no proof that plants and animals were ever produced otherwise than they are to-day.

The atom and molecule of the physical universe have always been, and still are, the atom and molecule from which plants and animals are built up, with the addition of that far-reaching and mysterious factor called life. The atoms and molecules aggregate and are marshalled by life into the symmetric and asymmetric forms (plant and animal) with which all biologists and physiologists are familiar. The atoms and molecules, as already stated, arrange themselves in straight lines and in spirals, and combine to form tissues bounded by straight lines and plane surfaces, or by curves and spirals. The straight line and spiral formations are met with in the simplest plants and animals, as well as in the most complex. They are seen even in the spores, seeds, and eggs. Rod-like structures are not uncommon in the beginnings of life, and spiral seeds and ova are of frequent occurrence in plants and animals. The rod-like and spiral formations are not chance structures. They are the results of reproduction, growth, and development, and have been going on throughout the ages. No one can, of course, say why the atoms and molecules arrange themselves in the manner indicated. We must accept the arrangement, as we find it in both the inorganic and organic kingdoms. The arrangement is to be regarded as an ultimate fact in physics, biology, and physiology. There is no getting behind or beyond it. It is not possible even to imagine that the endless examples of crystals, dendrites, and spiral formations and movements which we behold in the universe, and in plants and animals, are the result of accident.

The fact that crystals and dendrites are formed in unvarying sequence, and that plants and animals reproduce themselves, and have done so for countless ages, shows that they are, and have always been, under law and order. That they will so continue, while the present order of things lasts, can scarcely be doubted.

There is no need to assume that the plants and animals of the present day materially or fundamentally differ from the plants and animals of prehistoric times. That specimens, and even races of plants and animals, may have died out, and new forms come into existence, does not destroy the argument that the atoms and molecules forming the plants and animals of the present day act in precisely the same directions which they have always done.

Neither does it disturb the relations which exist as between the inorganic and organic atoms and molecules as a whole. The mere form or external configuration of plants and animals does not destroy the fundamental relations which are known to exist as between the inorganic and organic kingdoms. Great physical upheavals have, no doubt, occasionally dislocated, for the time being, those fundamental relations, but out of the wreck, so to speak, pre-existing or, it may be, even new races of plants and animals have arisen to supplement those which have perished; and the new races, like the old ones, have been linked to the physical universe by atomic and molecular action quite as closely as the primeval plants and animals were linked to a pre-existing state of things.

The relations between the inorganic and organic kingdoms is now, and always has been, of the most intimate description; a state of matters which compels us, when speaking of the origin, distribution, and lives of plants and animals, to consider the universe as we find it.

The question of environment is in all cases an important one, but it must never be forgotten that environment, while it slightly modifies plants and animals, never alters their constitution; it never makes a plant or an animal other than what it is by original endowment.

The life, and not the environment, asserts itself in such cases. Environment never produces a new organ in any organism, neither does environment act as a stimulus in goading plants and animals into activity.

Plants and animals, once created and endowed with life, work out their own destinies on the lines laid down for them. They defend themselves against environment when that is inimical, but the initiative, in every instance, comes from themselves. Environment is a dead thing. Plants and animals are living things, and are therefore superior to environment. It is a mistake to exalt environment over life, as is very frequently done. This necessitates the assumption and aid of a set of artificial conditions which, I venture to assert, do not exist. It requires us to take for granted that all the tissues of plants and animals, and plants and animals themselves, are irritable, and that they can only act in response to outside stimulation. This view robs life of its characteristic power, namely, the power of independent action.

The scheme of creation hangs together in a most extraordinary manner. The phenomena of day and night, and of the seasons, which exert such a beneficial influence on plants and animals, are directly due to cosmic movements now well understood. They are of the give and take order. They ensure periods of activity and repose, or, more strictly speaking, periods of comparative activity and comparative repose, to plants and animals; this alternating activity and repose being essential to their well-being.

Day and night and the seasons come and go at regular and calculable intervals. Day and night give and take light. The seasons give and take heat, moisture, etc. Day and night and the seasons provide for plants and animals, what is virtually a series of rhythmic movements. These movements are of primary importance in the organic kingdom, as they regulate, within limits, the time of feeding, building-up, resting, and hibernating of plants and animals.

The give and take, rhythmic movements, of the physical universe assume a great variety of forms. They appear in the alternations of day and night and the seasons. They are seen in the rise and fall of the tides, in cycles of drought and moisture, in wave movements of all kinds, such as those of light, heat, sound, etc.; but—and this is the marvel—they reappear in the rhythmic movements of plants and animals, *e.g.* in the spontaneous to-and-fro movements of certain leaves, and the time-regulated opening and closing of the vacuoles of various water plants; in the respiratory and circulatory movements of animals, as witness the opening and closing movements of the chest, heart, stomach, bladder, uterus, etc.

The physical universe, under the influence of a First Cause and of life, inaugurates the beginnings and the building-up of plants and animals; it also, under the same influences, takes the initiative in everything that pertains to their daily economy. Plants and animals are to be fed and rested; give-and-take movements on the part of the physical universe are consequently an absolute necessity. Plants breathe. During the day they take carbonic acid from the air and give oxygen to it. Animals also breathe. They take oxygen from and return carbonic acid to the air. Plants and animals in the matter of respiration reciprocate, the one supplying what the other requires. The respiratory movements in plants and animals are give-and-take interrupted movements, occurring at stated intervals, and therefore rhythmic in character.

Plants and animals, in addition to breathing, feed and circulate their nutritious juices. The feeding and circulatory movements, like the respiratory ones, are give-and-take movements, *i.e.* they occur in a certain order, and at stated intervals. Plants and animals not only take in, assimilate, and circulate extraneous substances rhythmically; they also give out the detritus or waste products rhythmically. The give-and-take rhythmic movements referred to have to do with every change which occurs in plants and animals; with the respiratory act, with the circulation of gases and fluids, with the absorption and assimilation of food, with the extrusion of waste products, with secretion and excretion, metabolism, etc. The give-and-take rhythmic movements are provided for in the very beginnings of life. The cells of plants and animals afford the necessary conditions. Vegetable and animal cells are composed of a cell wall, a nucleus, and protoplasmic cell

contents. The cell wall is porous, and provides an osmotic medium. When the cells are exposed to moisture, gases, heat, etc., two opposite or give-and-take virtually rhythmic currents are at once established; there is the comparatively rapid ingoing or endosmotic *nourishing* current, and the slower, outgoing or exosmotic *waste product* current. This explains how a plant or an animal composed of a single cell can live, grow, attain maturity, and reproduce itself. Living matter, lower than cells, possesses the same powers and exercises the same privileges. What is true of a single cell is true of every congeries of cells, and of all the tissues and parts formed by cells, in the simplest and most complex plant and animal organisms. Give-and-take movements are necessary to all.

The next arrangement and order of movement to be considered is the spiral. As already stated, the spiral formations and movements reveal themselves in the physical universe in a variety of forms; in the spiral distribution of nebulae, in the spiral water-spout, the spiral sand-storm, etc.

Has this spiral distribution and spiral movement of the atoms and molecules of matter in space any counterpart in plants and animals? Most assuredly it has. The seeds of plants, and the ova and embryos of animals, exhibit distinct spiral formations and movements. The seeds of *Chara helicteres*, and the ova of the cray fish (*Astacus fluviatilis*) provide the necessary illustration.

We have spiral formations and movement at the very beginnings of plant and animal life. These spiral beginnings are multiplied and emphasised as growth and development proceed; the highest representatives of the organic kingdoms providing the most numerous and striking examples. Thus in plants we find spiral cells, spiral hairs, spiral vessels, spiral stems, spiral branches, spiral leaves, spiral flowers, spiral fruits, etc. We also find spiral movements in climbing and other plants.

Similar remarks are to be made of animals. In these, the muscles, bones, and joints are spirally constructed and arranged; the heart, stomach, bladder, uterus, etc., also display spiral structure. All exhibit spiral movements. The movements of walking, swimming, and flying are, in every instance, spiral in their nature.

These spiral structures and movements are fundamental, *i.e.* they are not dependent on fortuitous circumstances, or any form of stimulation or irritation.

The question to be finally put is, How are the spiral structures and movements produced? They are, so far as I can make out, the result of independent growth and inherent endowment. The atoms and molecules of the growing and moving parts are distributed in spirals, and move in spiral directions. This they do under the influence and guidance of a First Cause and of life; the atoms and molecules, as has been already pointed out, having

a tendency to dispose themselves in straight lines or in curves—the latter, for the most part, taking spiral forms.

The spiral is a fundamental factor in structure and movement, behind which we cannot get. The spiral formation of soft and hard parts, seeds and ova, muscles, bones, joints, shells, horns. etc., are all, in my opinion, directly traceable to growth and original endowment; and to the spiral distribution of the atoms and molecules which constitute each particular form of growth and each particular kind of movement.

The spiral distribution and movements of atoms and molecules, in the organic and inorganic kingdoms, are under law and order, and the same law and order. There is not one law for the spiral inorganic, and another for the spiral organic formations and movements.

The spiral distribution and movements of the atoms and molecules in the two kingdoms are never accidental or haphazard. If this were so, the stability of the two kingdoms would suddenly cease and determine.

Growth and development, in order to meet the requirements of plants and animals, of necessity proceed in two principal directions, namely, in straight lines and in spirals. Plants and animals modelled on these lines are readily constructed, because they can grow or extend themselves into space without let or hindrance. They can also move with perfect freedom, as their moving parts cannot, under any circumstances, over-reach or interlock.

In conclusion, and as affording another proof that the physical and vital arrangements of atoms and molecules proceed on common lines, it may be stated that colonies of corals, in some cases, arrange themselves in convolutions, in all respects resembling similar convolutions occurring in human and other brains. The hard skeleton of *Euplectella* (Venus's flower-basket) is structurally a more or less perfect counterpart of the muscular fibres of the left ventricle of the mammalian heart. The leaf insect is in a great measure a facsimile of a real leaf. The nest of the trap-door spider in some respects resembles the flower of the pitcher plant. These can scarcely be considered cases of mimicry.

As regards the subject of mimicry, I am disposed to believe that different parts of the organic and inorganic kingdoms resemble each other in the matter of form, colour, etc., not so much from intentional or unintentional imitation, as from natural or inherent endowment.

The fact that animals are white in the Arctic regions, that the mountain hare and ptarmigan become white during the winter, and that animals, in very many cases, resemble their surroundings as regards colour and, occasionally, even as regards form, may, it appears to me, be explained less by a power of imitation than by a power of adaptability and of conforming to a general scheme,

where shape, colour, and other details are parts, but only parts, of a great whole.

Certainly the infinite variety of tints, and the gorgeous display of colour witnessed in the heavens, in flowers, feathers, hairs, shells, minerals, etc., cannot be accounted for by any theory of mimicry or imitation. Harmony of form and colour in the inorganic and organic kingdoms are proofs of unity and design. The harmony in question can scarcely be regarded as capricious or accidental, or even as the result of effort on the part of the things constituting the harmony.

Many other examples might be adduced to prove that inorganic and organic structures and movements very closely resemble each other.

The dendrites of minerals and metals, the frost pictures on window-panes and pavements in winter, the lightning flash, etc., are amazingly like the arborescent forms seen in the branches and leaves of plants and trees, the division and subdivision of blood vessels and lymphatics, the branching of nerve cells, bronchial tubes, etc., *to say nothing of the body itself*, which breaks up into extremities; the extremities in turn dividing into digits, and their expansions as seen in the fins and tails of fishes, the flippers of sea mammals, and the wings of insects, birds, and bats.

I am not aware that attention has ever been specially drawn to the manner in which the trunks of animals, as it were, proliferate by a process of budding; the limbs, even in the highest animals, appearing as fleshy projections or buds in the developing embryo. The limbs, while growing, also bud at their free extremities into digits, and the digits, in many cases, as stated, divide and split up to produce rays and membranes, as witness the pectoral, ventral, and caudal fins of fishes, the neuræ of the wings of insects, the flying membranes of the bat, the primary, secondary, and tertiary feathers of the wings of birds, etc. A very large percentage of all known animals assume the dendritic form. The dendrites in animals may be symmetric or asymmetric, *i.e.* they may display perfect symmetry as in certain star fishes, or asymmetry as in certain molluscs. The symmetrical animals bear a recognisable resemblance to crystals and symmetric plants. The non-symmetric animals are comparatively few in number, and may be regarded as exceptions to prove a rule. The dendrites in animals, in many instances, take the form of appendages—antennæ, hairs, cilia, suckers, probosces, etc.; they also, as explained, figure as arms, legs, wings, etc. The dendrites or outgrowths are functionally of great importance as sense-organs, as vehicles for securing food, and as instruments of locomotion. Even *Pseudopodia* take on the dendritic type and act in straight lines.

In the lower animals, we have examples of the dendritic arrangement in the *Vorticella*, *Polype*, *Hydra*, *Sertularia*, *Red Coral*, *Sea-pen*, *Actinia*, *Medusa*, *Comatula*, *Serpula*, *Rotifer*, *Sand-*

hopper, Beetle, Galeodes, Spiny lobster, Crab, Spider, the Leaf insect, Cuttlefish, etc.

In the higher animals, the dendritic arrangements appear, partly as tegumentary appendages (scales, hairs, feathers, horns, hoofs), and partly as travelling organs—fins, flippers, arms, legs, wings, etc.

The serpent—a typical vertebrate animal—if the scales and ventral plates be excepted, is destitute of dendritic outgrowths. In the *Lepidosiren*, four small tapering processes project from the under surface of the body, and prefigure limbs. In the siren, two very tiny rudimentary anterior limbs, with imperfect digits, appear. In the *Amplicuma*, these are increased to four (two anterior and two posterior). In the *Menobranchus*, the same arrangement obtains; the limbs, though still very rudimentary, being a little larger. The limbs increase in size, and become more differentiated in the triton and crocodile, and are perfected in quadrupeds and bipeds.

The tendency of the body to proliferate into extremities, digits, rays, etc., proves clearly enough that the dendritic, or branching type, is common both in the organic and inorganic kingdoms. In fact, the branching formations which occur in such great numbers in plants and animals are the analogues of the dendrites seen in minerals and metals; in the arborescent frost pictures; in the branching lightning, etc. Nor are the spiral formations so common in plants and animals without their representatives in the physical universe. These, as already indicated, have their prototypes in physical vortices, as seen in the spiral sand-storm, the spiral water-spout, and the spirally arranged nebulae. The physical spiral arrangements may not inaptly be regarded as the forerunners or heralds of the twisted stems and the revolving movements of climbing plants; and of the twisted bones and extremities of quadrupeds and bipeds, with their spiral joints and complement of spiral muscles and spiral movements.

No doubt many will fail to perceive any possible connection between spiral sand-storms, spiral water-spouts, spiral nebulae, etc., and the spiral stems and revolving movements of plants, and the twisted limbs and spiral movements of animals, as seen in walking, swimming, and flying; and if so, no one will be disposed to cavil or impute blame; still the resemblances are so striking, when carefully looked into, that no scientific inquirer can afford to pass them over. They are especially striking, when it is felt that they are the results of the spiral distribution and spiral movements of the atoms and molecules common alike to the inorganic and organic kingdoms. They, in fact, point to the existence of a great law of growth, development, and movement which reigns supreme in both kingdoms, whereby atoms and molecules coalesce to form crystals and dendrites in the physical universe, and plants and animals in the mysterious universe of life. The law indicated,

there is reason to believe, governs not only the major operations which produce movement and form in crystals, dendrites, plants, and animals, but also the minor operations which determine the arrangements and movements of the atoms which form molecules, of the molecules which form cells, and of the cells which form tissues.

There are good grounds for believing that the distribution and movements of atoms and molecules in the organic and inorganic kingdoms are not essentially different, what difference there is being traceable to the presence of life in the organic kingdom; life controlling, within limits, the elements of the inorganic kingdom, but working virtually on the same lines as obtain in that kingdom.

The ultimate distribution and movements of matter in the organic and inorganic kingdoms, when one comes to think of it, should not materially differ. The one is part of the other. The organic comes from and returns to the inorganic; the elements in both are the same. The plant and animal borrow all the materials forming their bodies, and much of the force which energises them, from the inorganic kingdom. There is therefore no room for antagonism between the organic and inorganic kingdoms, in so far as the dendritic and spiral formations and movements which prevail in both are concerned.

The oneness, the practical identity, structurally and functionally, which obtain in the organic and inorganic kingdoms, afford perhaps the strongest argument for design yet put forward. It shows that the great First Cause is the author of the organic and inorganic kingdoms alike; that He works continually, and on the same lines in both; that the two kingdoms are complementary, in fact, working parts of each other; that the organic kingdom, while an elaboration and differentiation of the inorganic kingdom, is in no sense an inimical elaboration.

This accounts for the reciprocity which is known to exist as between plants and animals, and as between both and the physical universe; for the reciprocity which is known to take place as regards the intake and output of extraneous matters (solid, fluid, and gaseous) during the lives of plants and animals; for the reciprocity of day and night, and the seasons, in their bearing on the growth, development, and rhythmic movements of plants and animals; for the continued prevalence of law and order in the physical universe, and in the world of plants and animals, whereby the latter, and all parts of the latter, are duly provided for as regards locality, environment, food, etc.

As, on the one hand, it is impossible to conceive of the physical universe as a chance combination of heterogeneous substances and movements, so, on the other hand, it is impossible to imagine the great kingdom of plants and animals as the product of spontaneous generation and of accident. The controlling power of the

Creator alone can explain the glories of the heavens and the wonders of animated nature. The same master-mind regulates the outgoings and incomings of both. It is unphilosophical to assume that law and order prevail in every department of the physical universe, while no care, or very little, is bestowed on the members of the vegetable and animal kingdoms, these being, as it were, left to shift for themselves, and to fight their own battles, or struggle for existence. Logically we are bound to conclude that the myriads of tiny rudimentary plants and animals, as well as the multitude of differentiated, complex organisms, and all the organs and parts thereof, are directly under control and supervision. This alone will explain the mysterious powers exhibited by untold millions of almost invisible low plant and animal forms, and the vegetative functions in the higher animals and in man himself.

In a short paper like the present, it is not possible to do justice to such a far-reaching subject; the more especially as I have not seen my way to introduce a large number of original illustrations which I have been collecting for several years past. The illustrations in question, with an extended exposition of my views, will, I hope, form the subject of a separate work to be published on a future occasion.

REMARKS ON TWO CASES OF ENTERIC FEVER, COMPLICATED WITH RIGORS AND EXACERBATIONS OF HIGH TEMPERATURE.

By VINCENT DICKINSON, M.D., M.R.C.P., *Assistant Physician to the Italian Hospital, London.*

My attention was first drawn to this subject by a paper read by Dr. Abercrombie before the Royal Medico-Chirurgical Society of London, on February 9, 1897, on "Some Affections of the Nervous System met with in association with Typhoid Fever," in which he brought under notice the occurrence of rigors in this disease. The notes of two interesting cases which came under my own observation may perhaps prove of interest, as a contribution to the study of irregular typhoid pyrexia.

In the autumn of 1896 I happened to have two cases of enteric fever at the same time, which were traced to the ingestion of uncooked oysters. In both these cases irregular attacks of pyrexia occurred.

CASE 1.—The first case was that of a gentleman, æt. 45, whose illness commenced about a month after a meal of oysters, with vomiting, retching, and headache, and variable abdominal pain. These symptoms continued for a week before I saw him, when he presented the same symptoms,

and had a temperature of 103° F. A few days later, characteristic spots appeared.

At varying intervals the patient had severe rigors with rise of temperature followed by sweating, the last of which occurred in the sixth week of the illness, and in which the temperature rose to 105°. After this last rigor the temperature remained permanently normal, and convalescence was established.

The only other noteworthy feature about the case was, that there was rather more abdominal pain than is usually met with in cases of enteric fever, although there never was at any time anything suggestive of the existence of peritonitis. There was also considerable perspiration, and the stools at times were very offensive; it was noticed that the rigors occurred not at the time of any diarrhoea, but usually after a day or so constipation. The drugs administered were benzonaphthol and quinine; later on, also digitalis and brandy.

My second case is of extreme interest, as subsequent events seemed to afford a possible explanation of the rises of temperature.

CASE 2.—The patient was a gentleman, æt. 60, of gouty habit. In August and September of 1896 he had an attack of suppurative phlebitis in one leg, which necessitated free incisions to open up sinuses. By October 16 the temperature was normal, the suppurative process had ceased, and the wounds were granulating up rapidly. At this time he was ordered a dozen oysters daily, and ten days later his temperature began to rise, and he entered upon what proved to be a well-marked attack of enteric fever. There were characteristic stools, abdominal distension with slight tenderness in the right iliac fossa, and enlarged spleen, but no spots. The temperature chart showed a fairly typical course. Defervescence occurred on the twenty-first day, but was interrupted by a relapse, in which the temperature rose to 105°. Convalescence was established on the nineteenth day of the relapse—that is, on the forty-first day since the commencement of the attack. With the exception of a mild cystitis, convalescence now proceeded uninterruptedly for twenty-one days, the patient was gaining strength, the bowels acted regularly, and he had left his bed and been out. On December 27, however, the sixty-third day since the commencement, he had griping pains in the abdomen with shivering, and the temperature rose to 105°. The abdominal movement was quite free; there was no tenderness, the tongue was clean, and there was no nausea or vomiting. The temperature almost immediately began to fall again, with sweating, and was normal in three days—December 30.

A few days later, the seventieth day of the illness, another rise took place which was more prolonged and severe, but attended with the same symptoms; the temperature rose to 106°, and became normal in four days. Thinking that perhaps there might be some intestinal irritation, he was given some calomel, which produced the evacuation of some very hard whitish scybala; Franz Joseph water was ordered every morning. A week later there was a third attack, which, although not so severe nor preceded by so much griping pain, lasted four days. Eight

days later, on the ninety-second day of the illness (January 26, 1897), he had his fourth and last attack, which was very mild compared to the others, the temperature only reaching $100^{\circ}4$. He had no further attacks, but complained of discomfort in the abdomen—"as if the bowels were going to act," as he expressed it, which was worse about an hour and a half after food, and better after the bowels acted. No local physical signs could be detected, except slight tenderness in the right hypochondrium. At the end of March he went abroad, and with the exception of the above symptoms seemed quite well. His troubles, however, were not over, for while at Lausanne he was seized with symptoms of intestinal obstruction, of which he died. As far as I could gather, the symptoms seemed to point to a perforative peritonitis.

In both these cases there were several rises of temperature of marked extent, preceded by a rigor or chilliness, and ending by a crisis more or less rapid; and it will be observed that they are quite distinct from the large oscillations of temperature often noticed at the end of a case of enteric fever; and in my second case they occurred when the convalescence of the patient seemed quite established after a true relapse.

The rises of temperature began suddenly, sometimes in the morning and sometimes in the latter part of the day, when the usual evening exacerbation would take place. There were no prodromal symptoms, the general aspect of the patient being satisfactory, and there was no sign of any local complication capable of producing this sudden elevation of temperature.

The rigor or chilliness was the first symptom; in the first case it was very marked, resembling the commencement of an ague fit; the patient's teeth chattered, his hands trembled, and shook the bed; this lasted about an hour. The rise of temperature was rapid, and took place during the occurrence of the rigor, and on one occasion reached 106° ; the hot stage lasted some hours, generally much longer than an ague attack, and was followed by profuse sweating. The fall of temperature was rapid, usually reaching normal in twelve hours. In the second case a subsequent sub-normal temperature was noticed in one instance, lasting a couple of days. In the first case, where the rises occurred during the fever, the temperature did not fall to normal. There was some lassitude after the attack, but it passed off in a few hours, and there was no expression of grave illness even after a severe attack, and the general condition of the patients remained good. A careful search failed to discover any of the usual complications of enteric fever, and there were no bedsores, nor any condition of the skin which would give rise to any secondary infection. No marked abdominal distension occurred; the liver and spleen were slightly swollen in one case, but not in the other; and there was no jaundice, nor any signs of perforation, peritonitis, or intestinal hæmorrhage; moreover, it may be observed that these complications produce a *drop* in the temperature rather than a rise.

In the second case, the existence previously of suppurative phlebitis raised the suspicion of the development of ulcerative endocarditis, but though the heart was repeatedly and carefully examined, no murmur was ever detected, and, moreover, the respiratory apparatus remained intact, and the exacerbations of temperature were not followed nor accompanied by blood-stained sputum, the signs of a pulmonary embolism being entirely absent. Lastly, it was impossible to discover any focus of suppuration.

The periods between these febrile attacks varied; about five days was the average interval, and, during this, the temperature pursued a natural course in the first case, and was normal in the second case, and unattended with any serious symptoms indicating a severe affection of the system.

In the first case it may be questioned whether either the abdominal tenderness, the offensive stools, or excessive perspiration were in any way connected with the rigors. They might possibly be explained on the supposition of a saprophytic absorption from the bowels, aided by the retention, resulting upon deficient action of the bowels.

Considering the seat of pain in the second case, namely, in the right hypochondrium, one is reminded of the possibility of a gall-bladder lesion. Marmaduke Sheild published a case where this complication occurred, but in his case the symptoms were marked, and so were the local signs. I do not think that the seat of pain militates against the idea that the appendix might have been the seat of the mischief, especially when one remembers how marked and latent affections of the appendix may remain for a long time.

Chantemesse and Jaccoud, among others,¹ have shown that the *Bacillus typhosus* of Eberth can produce pus and form indolent abscesses, almost painless and likely to be overlooked, unless every part of the body is examined. These abscesses seem, however, to occur chiefly under the periosteum and in the fibro-cellular tissue of the limbs.

Abercrombie, in the paper above referred to, stated Dr. Gee's dictum, that although rigors occurring during enteric fever may mean the supervention of peritonitis or perforation, they may also have no such grave significance; and he had himself noticed, in some of his cases, they were due to constipation, or any form of intestinal irritation.

Osler² discusses the occurrence of rigors in typhoid fever, and describes a number of cases, which may be classified thus:—(1) Occurring at the onset of the disease. (2) At the outset of relapses. (3) From the use of antipyretics, such as antipyrine and guaiacol. (4) At the onset of complications, such as venous

¹ *Bull. et mém. Soc. méd. d. hôp. de Paris*, 1893.

² *Johns Hopkins Hosp. Rep.*, Baltimore, vol. v.

thrombosis or bronchitis. (5) Due to concurrent malaria. (6) Due to unexplained causes.

He describes two cases which somewhat resemble mine; in one, rigors occurred in the seventh and eighth weeks of illness, and in the other from the fifth to the eighth week, neither being so late as in my second case. Both these cases recovered. In the same volume, he gives eleven cases of post-typhoid elevation of temperature. In some the rise seemed to follow the ingestion of solid food or fruit, or the occurrence of tonsillitis or pleurisy, but in five cases out of the eleven nothing was found to account for the rise.

Gee¹ considers the febricula, occurring during convalescence, to be associated with constipation in nearly every case.

According to Bouveret,² who has published four cases very similar to mine, these febrile attacks are not really serious; the patients made a good recovery, and their convalescence was not retarded, an important point as regards prognosis. The sudden occurrence of a violent febrile attack, with three stages characteristic of a malarial attack, the good general condition before and after, and the absence of any local complication, all suggest the possibility of a malarial fever developed at the end of an attack of typhoid. But this theory is hardly admissible, since neither of the patients were malarious or had lived in malarious districts. Besides this, the attacks lacked periodicity, and quinine given seemed to have no influence over them. There was no question of a general pyæmic condition, since the attacks passed off and left no trace. None of the known complications of typhoid can be set down as a cause, for these reasons—there were no signs of any existing local lesions, and no local complication causes such peculiar variations of temperature. Besides, the patients got rapidly over the attacks, which is not the case in the presence of ordinary complications.

Secondary infections are known to be common at the decline of infectious diseases, and particularly of typhoid fever. Have we here an infection of the nature of a secondary septicæmia? Probably not, for septicæmia is a complication of extreme gravity, to which most of the patients succumb. The febrile attacks of septicæmia are also characterised by rigors and high temperature, but they are repeated with much greater frequency, and we do not find interfebrile periods of several days, during which the general condition is so good that the patient seems convalescent or even recovered. The aspect of a typhoid patient with secondary septicæmia was absent in these cases, and this condition is usually accompanied by local lesions, especially broncho-pneumonia and suppurative pleurisy. These localisations of the septicæmic process were absent in the patients.

¹ *St. Barth. Hosp. Rep.*, London, vol. x.

² *Lyon méd.*, 1892, No. 23.

If these reasons are not sufficiently convincing, and if we still seek to attribute these severe febrile attacks to some septic absorption, we are forced to recognise that it must be of a special and mild kind, quite distinct from the usual grave forms observed at the decline of enteric fever.

Doubtless a violent rigor most usually indicates the sudden passage into the blood stream of some toxic and thermogenetic substance, but it seems certain that this substance proceeds from the typhoid infection itself and is not the ordinary septic infection. Supposing a true septicæmia or even a local septic or suppurative lesion existed, the temperature chart would probably have a very different aspect, showing that of septicæmia instead of that of enteric fever.

Peyer's patches, the mesenteric glands, and the spleen appear to be the principal foci where the poison of enteric fever multiplies. In these foci are elaborated the principal toxic and thermogenetic agents, whose entry into the blood produces the distinctive symptoms of typhoid infection. In the majority of cases the foci become gradually exhausted, hence the gradual diminution of the pyrexia and other symptoms. It is conceivable that the regular course of defervescence might be disturbed by the sudden entrance into the circulation of a large dose of the principal toxins, which otherwise would have been eliminated in a more slow and gradual manner, and perhaps the process of repair taking place in the intestinal lesions, associated with local circulatory changes, may lead in some measure to this result. It is noticeable that the febrile attacks took place during the defervescence of the fever, that is to say, at the time when the healing of the intestinal lesions was being carried on. The violence of the febrile attacks, and particularly of the rigor, is explained by the great impressionability of the thermogenetic centres at the decline of enteric fever of long duration. We know that with a typhoid convalescent the temperature is not so stable as normally; a slight cause, such as indigestible food or even strong mental emotion, is sufficient to send up the temperature to a noticeable degree. It is not impossible, also, that in certain conditions the virus of a certain malady may produce morbid phenomena, at variance with the ordinary clinical picture furnished by the malady. The question of prognosis is one of great importance. The sudden occurrence of a violent rigor at the decline of an attack of typhoid fever is calculated to excite the direst alarm.

Now, a rigor occurring like this is not always a sign of danger, says Bouveret, in the same paper; the prognosis depends on the diagnosis. It is easy to eliminate malaria, pyæmia, local complications of an infective or suppurative character. It is with septicæmia that the diagnosis presents more difficulty—at all events, during and immediately after the first attack. Later on, we have as elements of a differential diagnosis, the general conditions being

good, the absence of complications, the regular course of the temperature between the attacks, the absence of thoracic signs of septicaemia, the absence of any lesion of the skin likely to act as a primary source of infection. Thus, by a process of elimination, we are driven to attribute the cause of the febrile attack to the enteric fever itself.

Whether the subsequent fatal termination of my second case was connected with these febrile attacks, or was entirely fortuitous, is a difficult question. It may have been some remote result of the suppurative phlebitis, or it may be that some toxine from Eberth's bacillus had formed a nidus which led to the formation of an indolent abscess, such as Chantemesse and Jaccoud describe, but situated in the appendix vermiformis, liver, or some other part of the intestinal tract, and which one day ruptured and caused death.

It may be added that both these cases during convalescence gave the typical "clumping" reaction to Widal's test.

PERNICIOUS ANÆMIA: WITH AN ANALYSIS OF EIGHTY-SEVEN PUBLISHED CASES, AND AN INQUIRY INTO THE AFTER-HISTORY OF TWENTY-TWO REPORTED CURES.

By HORACE C. COLMAN, M.D. (Edin.), *Broughty-Ferry*.

(Concluded from page 260.)

Treatment.—A disease, the pathology of which is not well understood, has seldom a satisfactory treatment; such is the case with pernicious anæmia. The frequency of fatty heart at once indicates the need for rest and usually rest in bed, so also saving the body wear and tear as much as possible.

There is a general agreement that a milk and farinaceous diet is the most suitable. Hunter and Stephen Mackenzie both assert that a nitrogenous diet increases normal blood destruction. Of course this diet must not be too rigidly adhered to. Symptoms such as vomiting and diarrhœa or hæmorrhages must be controlled by appropriate remedies apart from the main attack on the disease.

Dyspnœa is sometimes very much relieved by oxygen inhalations. In a case of profound anæmia from hæmatemesis, the oxygen seemed to give great relief, and to tide the patient over the interval during which the blood was regenerating itself. Of course, great attention must now be paid to the teeth, and any offending member removed. To the treatment of the suppurative condition I shall refer again.

The main treatment can be divided into three groups: (a)

Principally directed to stimulate blood formation, pre-eminent in this class is arsenic, and with it are phosphorus, iron, and probably bone marrow. (b) Directed to influence the suppurative or fermentative processes existing or believed to exist in the alimentary canal. Under this head comes lavage of the stomach, and the use of antiseptics as mouth washes and internally. (c) Directed to act upon the blood immediately, namely, transfusion in all its modifications and massage.

It is easiest to take the last group first. Probably the beneficial effect of transfusion is but temporary; it is difficult to see how it can give more than a filip to the organism.

Cases of benefit have been recorded by Brakenridge (³⁷), Quinke (³⁸), Evans (³⁹), Lammiman (⁴⁰), Bramwell (³); but except in Brakenridge's case the effect was only temporary, though in one case (Evans) the patient was *in extremis*, and rallied with the transfusion, and then under arsenic made an apparent recovery. On the other hand, Pepper (⁴¹) found that transfusion did harm to all his patients. In my third case, the patient was very much worse after transfusion, but this might be partly due to the suppuration that occurred.

Probably the injected corpuscles are useful during their lifetime, but go to destruction just as the native corpuscles do. In those few cases where permanent improvement has followed the transfusion of blood, it would seem that the added blood has enabled the body to make headway against the disease probably by stimulating the blood-forming tissues. It is not likely that the subcutaneous injection of blood, as advocated by Litten (⁴²), can have any advantage over venous transfusion, and it has the disadvantage of being extremely painful. Saline transfusion can merely be a mechanical aid to the circulation, and rectal and intraperitoneal injections of blood need not be discussed, though they have been advocated. From transfusion, therefore, only a temporary benefit can be expected, and even that is not always obtained, but sometimes the very reverse.

Massage has been recommended strongly by Gladstone (⁴³), and Osler (²⁹) says it is sometimes of benefit, but how anything but a general stimulation can be expected I cannot see.

The use of the second class of remedies owes its existence entirely to the advocacy of Hunter, and, regarded in the light of his most recent paper, is of very considerable importance.

I have already referred to the grounds upon which Hunter recommends the use of antiseptics. He recommended β -naphthol at first as being the more useful—a drug which my third patient found most intolerable—but in his later cases (³³) he had some success with salol, salicylic and calomel, and mercuric chloride, and even enemata of salicylic acid, though in no case could the result at any time be regarded as a cure. The patients improved, but ultimately all died of the disease.

Dr. Gibson, whose first case is No. 8 in the table of cures, tells me he had successful results (apparent cures) in several other cases in which β -naphthol alone was used. In my third case there certainly seemed to be some good resulting from the use of salicylic acid. This mode of treatment has not been much used, only in six in eighty-seven of the cases I analysed, and in every case in addition to other treatment.

Hunter's recent paper has placed their use on a less theoretical ground than before, and it is certainly right treatment to try the use of antiseptics not as a sole means of treatment but in addition to other means, and if it be found as Hunter believes, that at the bottom of every case there lies an infective condition of some part or other of the alimentary canal, then we should expect some good result from their use.

Lavage of the stomach as practised by Landoz is but another mode of reducing putrefaction. The actual drug used is not, I think, of great importance. In this connection it is interesting to note that the large doses of arsenic so frequently given in this disease must be capable of exciting an antiseptic action, in the stomach at any rate.

At the present time, notwithstanding Hunter's theory, our chief means of treatment lies in the first group. The first and far the most important member of this group is arsenic. Introduced first as a definite and appropriate means of treatment of the disease by Bramwell (⁴⁴), it is interesting to note that it had been used by both Wilks (⁴⁵) and Pepper (⁴¹), though these observers merely used it in a routine fashion and without success. Since Bramwell published his first success there have been numerous cases reported where improvement followed its use, and in the twenty-two cases published as cured it was the drug that brought about a favourable result in fifteen instances, and the only two cases known to be alive after a considerable time were both treated with arsenic.

In two severe cases I have seen arsenic produce apparently a complete return to health, in both unfortunately the disease returned. The best mode of administration is the liquor arsenicalis, starting with a daily dose of 6 or 9 minims, and increasing the dose gradually or rapidly according to the patient's tolerance of the drug, and when a large quantity is being taken it is as well to divide it into doses not exceeding 10 or 12 minims. The drug may also be given hypodermically, and M'Call Anderson (⁴⁶) and Kering (⁴⁷) have met with success with this method. It must, however, be remembered that large doses of arsenic have their danger. I have seen great irritation of the eyes (Case 2) and also herpes which has also been described by Handford (²²), and in his case there was pigmentation in excess. Hunt (⁴⁸) and Barrs (⁴⁹) record the occurrence of peripheral neuritis, in Barrs' case it was very severe, but both ultimately recovered. These large doses require to be carefully watched, but it often is essential to push the drug

to the utmost limit of safety, and cases have been described where good only followed on large doses being substituted for small (⁴³).

From my experience with my second case I should be inclined to regard as dangerous a sudden cessation of the arsenic when large doses are being taken; it is certainly safer to reduce the dose considerably rather than omit the drug suddenly. There is nothing in any individual case to indicate whether arsenic will be tolerated or not, but it certainly should be tried in every case. Diarrhœa and vomiting are not necessarily contra-indications; the fact that in cases where there has been persistent vomiting and diarrhœa, the administration of arsenic has stopped these symptoms, points rather to their being caused by the process of the disease (*i.e.* a pathological state of the liver) rather than that they and the disease are due to some pathological condition of the alimentary canal; for, were the latter the case, the arsenic would rather tend to increase the irritation presumably present. On the value of arsenic in the treatment of disease there is no dispute, but as to its mode of action there is some divergence of opinion.

I have already referred to the antiseptic action. Hunter (²⁶) believes its action is purely local, and in that way supports his theory. That this is not its sole action I am convinced. There is no direct evidence of arsenic having any action on the liver, though Foxwell (⁵⁰) states that it lessens the "ferrogenic function" of the liver. Of this action I have not been able to find any experimental evidence, but it is quite conceivable that arsenic does so act. In favourable cases treated solely by arsenic, the actual destruction of blood undoubtedly decreases in addition to the notable increase of new corpuscles.

As to the increase of corpuscles with arsenic, there is direct and indisputable evidence both clinical and experimental. Many cases are on record (of which an example is seen in Case 2), where, with the administration of arsenic, the irregular and abnormal corpuscles nucleated and others are seen to become less and less numerous, and to be replaced by healthy normal red corpuscles; even without the experimental evidence I shall quote, one would have no hesitation in putting this down to a direct stimulation of the bone marrow.

Stockman and Greig (⁵¹), by experiments on rabbits with arsenic, conclusively showed that, in the rabbit at least, arsenic has a distinctly stimulating effect on the red bone marrow, causing it to increase and replace the yellow and also to produce many more red cells. They found no alteration in the circulating blood and no evidence of increased destruction, and concluded that there was some physiological process that prevented the corpuscles circulating exceeding a certain number, which has only been overcome by a change in altitude.

Copeman (⁸), who found that in pernicious anæmia he was able to cause hæmoglobin to crystallise out from the corpuscles, noted that

after the case had been treated with arsenic this could not be brought about. The explanation of this may be that the arsenic stimulates the bone marrow to produce corpuscles that will hold the hæmoglobin more firmly, or that the arsenic has an additional action on the ferrogenic function of the liver, and so modifies it that its power of loosening the connections of the hæmoglobin is lessened, possibly both are true, and almost certainly the first is. Arsenic, therefore, has a definite action as a stimulant on the bone marrow. As I pointed out, there is no reason whatever for thinking that the disease originates in the bone marrow; but given excessive destruction, there must be at first excessive production of red corpuscles, but ultimately the producing tissue (the bone marrow) becomes exhausted to a greater or less degree. In some cases, by means of arsenic the bone marrow can be stimulated sufficiently to provide for the increased destruction (leaving out for the moment any other possible action of arsenic).

It is easy to see that a time must come when the stimulus begins to be ineffective, and in this we see the reason why, in relapses, arsenic is less beneficial—the bone marrow is incapable of responding. It is therefore best that after apparent cure the patient should continue to take arsenic; on this point Bramwell is very emphatic, and this treatment was carried out by one of the two patients mentioned who are still alive, for many years after the original attack. Probably the bone marrow responds best to a stimulus continuously and gently applied, but we must not lose sight of the possibility of arsenic exercising a controlling effect on the ferrogenic function of the liver.

It is natural that *phosphorus*, a body so closely allied chemically to arsenic, should be used in the treatment of this disease. Broadbent ⁽²³⁾ is the chief advocate of the use of phosphorus, and has had considerable success with it, and says in a letter to me, “an old lady of over 80 has taken phosphorus constantly for twenty years, though she was considered to be in a hopeless condition from pernicious anæmia when I first saw her.” Experiments with phosphorus have not produced any conclusive result, but it appears to increase the red cells. Phosphorus is certainly worth trying where arsenic is contra-indicated; the dose, however, cannot be increased. My experience with it is limited to one case (Case 3) where slight temporary improvement followed its use when I had long abandoned all hope.

Iron is generally condemned as useless and often harmful in this disease. In my second case (in 1898) I found that from the fourth to the fifth week there was very little increase in the number of corpuscles, and so I gave iron in addition to the arsenic with most satisfactory results. Cases have been published where a cure resulted from the administration of iron alone, by Finlay ⁽⁵²⁾, Bramwell ⁽⁵³⁾, and Quincke ⁽⁵⁴⁾, but these cases are quite exceptional. Bramwell ⁽⁵³⁾ says that in his later cases he has given iron

in addition to arsenic, though it requires careful watching and may do harm, and in one case certainly increased the diarrhoea.

I think the failure or success of iron may be explained in the following way: In the first place, it may irritate the alimentary canal, and so do harm directly; in the second place, there is an excess of iron as hæmoglobin, or modifications thereof, in the body while the disease is active. When, however, the arsenic has stimulated the bone marrow to produce a more abundant supply of new red corpuscles, this excess of iron may be used up to complete them, and then it may be useful to administer iron by the mouth.

The study of the alterations in the blood of my second case made it appear probable to me that something of the sort occurred. Aperti of Pavia ⁽⁵⁵⁾ made some experiments that tend to support this view. A dog was rendered anæmic by repeated bleedings. He then was given intravenous injections of arsenic for a week or so, and then injections of iron. The results obtained were fairly constant; after the arsenic the corpuscles increased in number, and after the iron the hæmoglobin equivalent was raised. He says that clinical observation has confirmed this. Iron, therefore, should be given with caution. It is useless to expect good when there is evidence of excessive destruction, but when improvement has begun it will often do good, and especially, I believe, when the increase of hæmoglobin seems to lag behind the increase of corpuscles. The most satisfactory preparation is the Bland pill in capsules.

Bone marrow was first successfully used by Fraser ⁽⁵⁶⁾ in a case already referred to; Barr ⁽⁴⁹⁾ and Daneforth ⁽⁵⁷⁾ have also reported cures, and Stengel ⁽⁵⁸⁾ considered he got some benefit from it in conjunction with iron and arsenic. Unfavourable reports have been published by Hunt ⁽⁴⁸⁾, Drummond ⁽⁵⁾, Box ⁽⁵⁹⁾, Billings ⁽⁶⁰⁾, and M'Call Anderson ⁽⁴⁶⁾. It has been used with benefit in so many anæmic conditions, that it can only be supposed to act as a stimulant of the existing bone marrow conveying to it, when absorbed, some body that is necessary to stimulate the cells. Apparently the yellow bone marrow is often employed, though one would expect the red to be more efficacious. Stockman ⁽⁶¹⁾ says that the marrow used for Fraser's and Barrs' cases at the Edinburgh and Leeds Infirmarys respectively, was yellow marrow consisting of fat and connective tissue, and an infinitesimal quantity of iron, and that the butcher informed him that a calf would only yield 3 to 4 oz. of red bone marrow.

From the foregoing it will be gathered that there are no hard and fast rules for treatment, but probably most success may be hoped for from rest in bed, farinaceous diet, the use of some intestinal antiseptic and mouth wash, and above all, from arsenic in increasing doses, and, after some improvement has been shown,

from the additional and cautious use of iron. Should the arsenic fail, then recourse must be had to phosphorus and bone marrow. In very advanced cases temporary benefit may result from transfusion. Lastly, should a favourable result ensue with arsenic, the patient should continue that drug for a very long period, even though feeling in perfect health.

Summary of Analysis of Eighty-seven Published Cases.

Cases.—Eighty-seven; male, sixty; female, twenty-seven. *Onset.*—Gradual, seventy-seven; rapid, ten. *Diarrhœa.*—Present, twenty-nine; absent, twenty-six; not mentioned, twenty-two. *Vomiting.*—Present, fifty-six; absent, fifteen; not mentioned, sixteen. *Diarrhœa and vomiting together.*—Present, twenty-one; both absent, sixteen. *Jaundice.*—Present in eight cases. *Retinal hæmorrhages.*—Present, forty-two; absent, nineteen; not mentioned, sixteen. *Urine.*—High colour, twenty-seven; normal, twenty-eight; not mentioned, thirty-two. *Uric Acid.*—Nine cases. *Fever.*—Present, fifty-six; absent, ten; not mentioned, twenty-one. *Eichhorst's corpuscles.*—Present, six; absent, twenty; not mentioned, sixty-one. *Nucleated.*—Present, six; absent, sixteen; not mentioned, sixty-five. *Post-mortem examinations.*—Forty-eight. *Fatty heart.*—Thirty-three; doubtful, six; absent, three; not mentioned, six. *Fatty liver.*—Nineteen; doubtful, two; absent, nine; not mentioned, eighteen. *Excess of iron in liver.*—Twenty-two; doubtful, one; absent, one; not mentioned, twenty-four. *Fatty kidney.*—Nine; doubtful, one; absent, seven; not mentioned, thirty-one. *Iron deposit in kidney.*—Eleven; doubtful, none; absent, four; not mentioned, thirty-three. *Enlarged spleen.*—Nine; normal, fourteen; no mention, twenty-five. *Hypertrophy of bone marrow.*—Twenty; absent, one; no mention, twenty-seven. *Capillary hæmorrhages.*—Present, thirteen; absent, two; no mention, thirty-three.

*My own Cases.*¹

CASE 1.—H. G., æt. 47, schoolmaster, admitted December 3, 1898, died January 7, 1899.

History.—He had never been abroad, and had been a healthy man. Twenty years ago he had suffered considerably from piles, and three months before admission he had some slight bleeding from the rectum.

There was nothing bearing on the disease in the history, except that he said that twelve months before he was troubled with a cough, and took too much belladonna and collapsed. For six months prior to admission he had been an inmate of the county jail.

On admission he was extremely ill, too weak to walk, and complained greatly of thirst. Speech was very slow. Throat very dry, appetite very bad. His skin was very pale, with a faintly yellowish tinge; the gums and conjunctivæ were also very pale. The face and shape of the hands, coupled with the speech and large amount of fat present, gave a suggestion of myxœdema, but the skin was soft and smooth, and

¹ For permission to publish my notes of the first two cases I am indebted to Dr. Buzzard, Senior Physician to the Northampton General Infirmary, in which institution they occurred; the last two I saw in private practice.

slightly glazed. No note was made of the state of his teeth. Both fundi were pale, but there were no retinal hæmorrhages. The pulse was 100 per minute, regular and soft. Heart enlarged, apex just within nipple line in fifth space. Soft systolic murmurs at mitral and tricuspid areas. The liver and spleen did not appear to be enlarged. The bowels were extremely constipated, and he complained of a constant burning sensation about the rectum, but nothing abnormal could be discovered on digital examination. The urine was sp. gr. 1010, no other abnormality was noted (no note was made of the colour).

The blood.—Corpuscles did not form rouleaux readily; there were a few large and a few irregularly shaped corpuscles, and many with concentration of hæmoglobin. No Eichhorst's corpuscles were seen, nor any nucleated corpuscles, but no films were stained for these. Red corpuscles, 1,440,000 or 29 per cent., white 9000, hæmoglobin 28 per cent., giving a colour index of 0.96.

Treatment and progress.—For a week he was given 1 tabloid daily of thyroid extract, then small doses of arsenic and iron were substituted. These were not well borne, and diarrhœa supervened on the previous constipation. He became gradually worse, the thirst and rectal pain increased, and the red corpuscles decreased in number, and he became delirious and died on January 7. Death occurred rather suddenly, there being intense dyspnœa for twenty minutes before the end.

Post-mortem.—Heart, pale and flabby, dilated, valves healthy, muscle appeared so, and was proved to be on microscopic examination. Lungs slightly adherent, otherwise normal. Liver a little enlarged, the lower part stained black to a depth of $\frac{1}{3}$ in. Spleen normal. Both organs were examined by the Clinical Research Association, who failed to detect any excess of iron. Kidneys healthy. Intestines were very thin, but showed no signs of ulceration, malignant disease, or parasites, and nothing could be found in the rectum to account for the sensation described.

Bone marrow (femur) a dark purplish red, soft and all bony trabeculæ absorbed. The piece saved for the microscope was spoilt.

REMARKS.—This case was hardly typical. The absence of fatty degeneration of the heart, and of excess of iron in the liver, was an unusual feature. On the other hand, the state of the blood, and chiefly the high percentage of hæmoglobin, the rectal bleeding with no gross lesion to account for it, and the alteration in the bone marrow, warrant a diagnosis of pernicious anæmia. (Russell (62) mentions a case with a similar rectal sensation.)

CASE 2.—W. H., æt. 36, leather dresser, admitted August 18, 1898, died January 14, 1900.

History.—He was sent up to the ward as a case of jaundice. Four months previously he began to be troubled with dyspepsia, loss of appetite, and occasional vomiting and diarrhœa (occasional diarrhœa had been a source of trouble to him all his life). Two months previously, he noticed a change to yellow in his skin, but some weeks previous to that he had noticed a yellowness in his eyes (this, I think, certainly points to jaundice in the early stages). More recently still he had been troubled with shortness of breath and slight palpitation, and a few

weeks before admission his sight became very dim, and he had some headache. He had been a healthy man, but his work had been dusty and unpleasant for eight months past. It is interesting to note that his mother and brother had both suffered from "jaundice," both were at that time alive and well.

On admission.—He was weak, giddy, and breathless after walking upstairs. His skin was a pale yellow, and his conjunctivæ pearly, not at all the characteristic tint of jaundice. He was well nourished, but his weight had fallen from 9 stone 12 lb. to 7 stone 13 lb. There was a fair amount of fat about him, and no great muscular wasting. The skin was soft and smooth, and there was no œdema. Pulse regular, full and not jerky. Heart not dilated, sounds faint with a soft systolic murmur in tricuspid area. Tongue was moist, with a slight white fur (no note on the teeth).

He had at that time no dyspeptic symptoms, but the bowels were rather loose. The liver was two finger-breadths below the ribs in the mammary line, but not tender. The spleen was not enlarged. The urine was normal (but no note was made as to the colour). There was a hæmorrhage in the left retina. The knee-jerks were moderately active. The temperature for the first six nights rose to a little over 99°, but afterwards except for a few days at the end of treatment remained normal.

The blood.—The examination of the corpuscles is detailed in the table. The excess of white is probably due to the counts being taken soon after his dinner. The red corpuscles did not form rouleaux. Many irregularly shaped corpuscles were to be seen, some oval and much larger than normal, and some kite-shaped, and many showed concentration of hæmoglobin, and the average size was greater than normal. No Eichhorst's or nucleated corpuscles were seen, but no films were stained for the latter.

Treatment and progress.—He was at once given liquor arsen., 3 minims, t.i.d.—the dose to be increased daily by 1 minim, i.e. 3, 6, 9, etc. The effect on the blood was well shown. His appetite very soon became ravenous, and he was allowed an extra supply of food.

On September 7 the tricuspid murmur had disappeared, and the liver was normal. About that time the arsenic caused some irritation about the eyes, but by modifying the dose, it was soon allayed.

On September 19 he was given iron in addition to Robertson's Blaud pill capsules (= 2 pills) t.i.d., with apparent benefit. The colour of the skin was normal now. The maximum dose of arsenic reached was 1 drm. in the day, given in six doses. After that it was reduced to 40 minims, and irritation about the eyes setting in it was stopped altogether.

As soon as the arsenic was stopped, his temperature began to rise, and on the third evening, October 8, reached 104°. He then looked and felt extremely hot, but had no headache or rigor, and was sweating profusely. I gave him quinine and phenacetin and 24 minims of liq. arsenic. daily, and in two days he was perfectly well again.

There was no influenza about, and the blood condition was unaffected, and the fever seemed to be entirely due to the sudden cessation of the arsenic. I am satisfied that this was so, for a month or two afterwards a similar state of affairs occurred in a girl who was suffering from

Hodgkin's disease. In her case, after taking large doses of arsenic and the sudden cessation, there was a sudden rise of temperature with no accompanying features.

On October 22 he left hospital apparently in perfect health; all signs of the retinal hæmorrhage had gone. Knowing the almost universal fatal end of the disease, I determined to watch him.

He was well on January 10, 1899. I then left the district, but my successor reported him in July as "pretty well, but a little yellow again," obviously relapsing.

TABLE I.

Date.	Red-Blood Corpuscles.	Per Cent.	White-Blood Corpuscles.	Hæmoglobin.	Colour Index.	Remarks.	Treatment.
1898. Aug. 19	1,650,000	33	16,000	26	0·79	Many irregular shapes; rouleaux not found.	Arsenic started.
„ 26	1,740,000	35	10,000	50	1·42	Great diminution in irregular shapes.	24 min. arsenic.
Sept. 2	2,720,000	54	10,000	60	1·11	Very few irregular shapes.	40 min. arsenic, eyes a little sore.
„ 12	3,030,000	60	...	52	0·86	Corpuscles appeared normal.	Arsenic stopped on 9th. Begun again on 12th as on Aug. 19th.
„ 19	3,050,000	61	...	70	1·14	...	Arsenic, 27 minims; iron in addition.
„ 26	3,096,000	79	...	76	0·96	...	Arsenic, 49 minims, reached 1 drm. on 30th.
Oct. 3	4,700,000	94	20,000	70	0·74	...	Arsenic, 40 minims.
„ 11	5,000,000	100	...	82	0·82	Apparently normal blood. Maximum with Gowers' instrument is about 82.	Arsenic stopped for a few days, then 24 minims daily.

With difficulty I got news of him again, and heard he had died. Dr. Marriott of Northampton kindly sent me the following notes:—

"Briefly, he continued to get more feeble at times, and was rather violent and mentally excited. He suffered much from profuse diarrhœa, which was very difficult to check. He had one or two smart attacks of epistaxis. The blood was only faintly coloured. There was much fœtor of breath, and some sickness at times. There was no retinal hæmorrhage. Amblyopia and transient amaurosis were present.

He was treated with arsenic, beginning with a few minims (liq.

sodii arsen.) up to 12 to 15 minims, t.i.d. Great improvement for a time ensued, but he relapsed, and diarrhœa eventually necessitated the abandonment of the treatment. Opium and raw meat juice afforded most relief. The conjunctivæ were so deeply stained that more than one visitor thought he had jaundice.

This case is a very interesting one. He was seen early, and the disease was pursuing a rather rapid course, and at the beginning there had almost certainly been some real jaundice. Arsenic had a marvellous effect, and, at a later stage, iron seemed to be of benefit. The unequal rise of the hæmoglobin and corpuscles is well shown in the table, and this, with other points, has been referred to earlier. Further, the case illustrates the well-known fact of arsenic being less useful in relapses, and also how cases can come to be recorded as cured.

In January 1899 no objection could have been urged to a cure being recorded, yet in a year the man had died of the disease.

CASE 3.—M. C., æt. 52, surveyor of Inland Revenue, first diagnosed October 1899, died July 1, 1900.

Until three years before onset of illness his general health was excellent, but for many years he had had middle ear disease and a pharyngitis directly connected therewith. There was occasional discharge from the ear and a constant muco-purulent pharyngeal secretion, and an irritating cough. Three years ago he had a series of boils and a facial cellulitis, apparently directly produced by a spreading from the ear. His health suffered to some extent from this, and, in addition, he had a considerable amount of worry.

In May 1899 he felt his strength was declining, but continued to work. In September 1899 he had several fainting fits, and vomited once or twice, and people remarked on his yellow colour. In October he consulted a medical man, and about a month after that his blood was counted (see Table II.). In a few days he collapsed altogether. After that he kept his bed, for the most part, for two months, and from January 1900 was absolutely confined to bed till his death. There was no diarrhœa, but rather obstinate constipation, and no dyspeptic symptoms.

He had noticed that the urine was often high-coloured. The temperature averaged about 99–100. Nearly every possible means of treatment was tried. Arsenic, which was discontinued as it did not seem to suit his stomach, iron, bone marrow, antistreptococcal serum, all without benefit. Transfusion was tried and did harm undoubtedly, possibly because the wound suppurated rather badly, and there was considerable resultant cellulitis.

I saw him first on April 10, 1900. He was then extremely pale, the lips hardly coloured. There was only a slight amount of body fat. The lungs and abdominal viscera seemed perfectly healthy. There were no retinal hæmorrhages. The urine was the colour of brown sherry, sp. gr. 1015, no uric acid or urates or bile. The pulse was regular, full, and of fair tension, 85 to 90 per minute. The right side of the heart

was dilated (this increased considerably), no hæmic murmurs were to be heard. His appetite was excellent, and his diet consisted of milk, porridge, fish, chicken, eggs, and occasionally a little red meat and beer.

In view of Hunter's⁽³³⁾ recent paper, I made a careful examination of the mouth and throat. The tongue was very red, the epithelium very thin; there was no fur at all, and there were a few extremely red raw-looking spots, which gave him great discomfort. The natural teeth consisted of four incisors in the lower jaw, perfectly sound, clear, and with healthy gums, and also two bicuspid stumps, each situated in a little moat of pus (the false teeth were scrupulously clean). There was a chronic pharyngitis, with a sticky muco-purulent secretion difficult to remove. He was frequently troubled with catarrh of the Eustachian tube and left side of the nose. The left ear drum was absent. The whole state of the throat and nose seemed to be the direct result of the ear disease; discharge by the meatus ceased two years before.

The blood.—A drop was difficult to obtain, but was well coloured. The corpuscles did not form rouleaux. There were not many irregular shapes. Nearly all were of an oval shape, some with a single nucleus, and there were a few very large corpuscles. Not many showed the common concentration of hæmoglobin; one or two corpuscles appeared to be giving off buds. I saw no Eichhorst's corpuscles, but the nucleated corpuscles were comparatively frequent.

Treatment and progress.—In spite of the previous failure with arsenic, I determined to try it again. I ordered a dose of 3 minims, t.i.d., on April 13, and began to increase the dose gradually. For the pharyngitis, I ordered an alkaline gargle to remove the viscid secretion, and after its use, a glycerin and tannin paint. At this time he was still suffering from the effects of transfusion. On April 25 I removed the two stumps from his mouth, and gave him a mouth wash of 10 gr. ac. salicyl. to the ounce of water. For about a month there was a steady improvement in his general condition. His appetite and digestion were excellent, the bowels moved naturally each day; previously he required an enema. The temperature remained normal, the pulse steady. His cough gave him very little trouble, and the urine became much less dark in colour, only that secreted during the night being noticeably high-coloured. The patient expressed himself as feeling very much better, and was very hopeful, but, looking at the state of the blood, I could not regard the improvement as anything but a temporary change. On May 15 he took 44 minims of liq. arsenic., and the dose was then reduced to 40 minims. There had been slight epistaxis a day or two before, but his colour and general condition were still improving, and the urine was less dark. I tried betanaphthol, but it caused great abdominal pain, and the tongue now began to be sore again. For two days the urine was quite pale.

May 25.—Tongue was red and sore, throat painful, pulse rapid, urine very dark; altogether much worse, and, yesterday, was a little delirious. The dose of arsenic had been about 30 minims. At night there was much vomiting (acute indigestion from too much cream, I think), requiring morphine to suppress it. All arsenic was stopped.

[Continued on page 353.]

TABLE II.

Date.	Hæmo- globin.	Red Blood Corpuscles.	Per Cent.	Colour Index.	Remarks.	Treatment.
1899. October	...	1,114,000	22.2	...	Patient's note of previous attend- ant's observation.	...
1900. April 13	22	1,175,000	23.5	0.9	Corpuscles larger than normal; oval and some nucle- ated, and a few very large corpus- cles; slight rou- leaux formation.	Arsenic, 3 min., t.i.d., to be gradually in- creased.
„ 20	21	900,000	18	1.2	Nucleated fre- quent, some very large.	Arsenic reached 24 on 19th, re- duced to 15 min., and slowly increased.
„ 27	32	1,360,000	27.5	1.2	...	Arsenic reached 24 minims, again given ac. salicyl. 10 gr. to 1 oz. as mouth wash and to swallow.
May 4	22	1,618,000	32	0.7	Corpuscles have more healthy ap- pearance, irregular and nucleated forms much less frequent.	...
„ 11	32	1,430,000	32	1.0	...	Arsenic reached 32 minims.
„ 18	36	1,680,000	33.6	1.1	Nucleated very frequent, oval type predominated. Urine become much paler.	Arsenic = 44 min. on 15th, taking 40 now. Ac. salicyl. unbear- able.
„ 25	22	1,236,000	25	0.9	Urine very dark again, generally worse.	All drugs omitted owing to vomit- ing.
June 8	17	1,170,000	23	0.7	Corpuscles were nearer normal in appearance than have been so far. Still many oval & some nucleated. Urine much paler.	From May 27, pil. phosphori, 1 gr. t.i.d., and 4 daily since 2nd; ac. salicyl. 10 gr. t. i. d. since May 28.
„ 15	17	760,000	15.2	1.1	Oval shape, nearly all. Urine keep- ing pale.	Treatment as 8th until 17th, when phosp. and ac. salicyl. stopped, and arsenic re- sumed to please him.
July 1	...	Died.	...	...	Urine got very much darker co- incidentally with the stopping of ac. salicyl.	...

No Eichhorst's corpuscles were seen at any examination. Nucleated corpuscles were very numer-
ous. White corpuscles never exceeded three in 50 squares (Gowers), and generally only one or two.

May 27.—Vomiting ceased, appetite returned. Arsenic having had a fair trial, I determined to try phosphorus, which has been strongly advocated by Broadbent⁽²³⁾. I gave pil. phosphori (B.P.) 1 gr., t.i.d., at the same time giving him 10 gr. ac. salicyl. in wafer paper, t.i.d. At the same time, but too soon to be regarded as an effect of treatment, the tongue improved and the colour of the urine was lighter. Under this treatment he again improved considerably in his general condition, and on June 8 I made the note that the corpuscles had a more normal appearance than hitherto.

June 17.—Tongue again became troublesome and stomach squeamish, and from that day on he became rapidly worse, and died on July 1. Until all drugs were stopped on the 24th of June, the urine remained pale in colour, but immediately the salicylic acid was stopped the colour darkened; at the end it was extremely dark.

For a week before death there was a marked cadaverous odour about the patient.

REMARKS.—This case has several interesting points to which I have referred before, but it is as well to note here that the state of the mouth and the action of salicylic acid is much in favour of Hunter's latest contention. I would particularly call attention to the colour of the urine and the variation in it with salicylic acid, and the correspondence of the variation with an improvement in his general condition. Here, I think, is a case where the destructive process had gone on too long for the exhausted bone marrow to respond more than slightly to the stimulus of arsenic and phosphorus, and remedies antagonistic (or believed to be so) to that destructive process were applied too late.

CASE 4.—G. O., tailor, seen August 22, 1900. Patient was a visitor here, so I only saw him twice. His history was that for the past two years he had gradually been getting weaker, so gradually that he could fix no time for the beginning of his trouble. His chief complaint was persistent and progressive weakness and loss of appetite and shortness of breath. He had got very much thinner lately. He had been a healthy man hitherto, and steady, temperate, and hard working. He had, in the last month, two bouts of vomiting with no apparent cause. Early in his illness his eyes "went all wrong." Constipation was almost constant, there was never any diarrhoea. There was occasionally œdema round the ankles. His urine was very dark for days at a time, then lighter. At no time has he been of a yellow colour, and the motions had always been of a natural colour. At no time had he had any hæmorrhage.

Condition on examination.—He was extremely pale, the conjunctivæ being almost colourless. His skin was slightly sallow. He was thin, but fairly muscular. The tongue was dry and corrugated, there was not the thin epithelium so often seen in pernicious anæmia. He had only half a dozen teeth left, and these were loose, and he said that the others had fallen out recently. There was no caries in the teeth remaining, nor suppuration round them. Pulse, 108 per minute, low

tension, no hæmic murmurs. Lungs and abdominal viscera appeared healthy, and I could find no trace of malignant disease anywhere. There were no retinal hæmorrhages visible. The urine contained no albumin. On one day it was of a very high colour, and two days after was normal.

The blood.—Many of the corpuscles appeared larger than normal, and some much smaller, some were oval, and there were a few tailed forms. In a film I found one mononucleated red corpuscle, but saw no Eichhorst's corpuscles. There was slight rouleaux formation.

Red blood corpuscles = 1,580,000, or 31.6 per cent. Hæmoglobin, 38 per cent. = colour index of 1.2.

White blood corpuscles, 3 in 50 squares = 6000.

Treatment.—Liq. arsen., 3 minims, t.i.d., to be gradually increased. Ac. salicyl., 10 gr. t.i.d., in water, to be used as a mouth wash and then swallowed, and to see Dr. Lyon, his regular physician. October 4. —Dr. Lyon of Midcaldor writes: "He is at present very much better in his general health."

REMARKS.—This patient can, I think, only have been suffering from pernicious anæmia. There was nothing to account for the loss of blood, no kidney disease, malignant disease or malaria, and in favour of the diagnosis was the high percentage of hæmoglobin, the appearance of the individual corpuscles and the high-coloured urine and the causeless vomiting, and lastly the improvement with arsenic.

NOTE.—The figures given on p. 251, in reference to the amount of iron in the liver, denote the amount in 100 parts of dried liver substance, after the vessels have been washed clear of blood.

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ON THE DIAGNOSIS OF THORACIC AND CARDIAC ANEURYSM BY THE RÖNTGEN RAYS.

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(PLATES IX.—XI.)

OF all the various cases of chest disease to which the Röntgen rays may be applied, for the purpose of diagnosis, and perhaps even prognosis, there are none in which they are found to be of greater value than in the diagnosis of thoracic aneurysm. So much so is this the case, that I think we are justified in going so far as to assert that it is the duty of the physician to make use of this method of examination in all doubtful cases of chest disease, especially if from the signs and symptoms an aneurysm be sus-

pected. At a recent meeting of the Medical Society of London, a discussion was held on the diagnosis and treatment of aneurysm of the aorta. The value of the various signs of an aortic aneurysm, such as, tracheal tugging, diastolic shock, paralysis of the vocal cords, etc., were discussed, but no two speakers were in accord as to the value of these signs. The difficulty sometimes experienced in the diagnosis of aortic aneurysm, especially of the transverse and descending arch, was acknowledged by all. A method, therefore, by which an aneurysm, or rather the shadow thereof, can be actually seen must obviously be of immense value in diagnosis. It will be my endeavour in this paper to establish the value of the Röntgen rays as a means of diagnosis, and perhaps of prognosis, in cases of cardiac and thoracic aneurysm. It will be well, however, at the outset, to give a short description of the apparatus employed. To attempt to obtain a skiagram of the chest that will be really useful in diagnosis, without an efficient coil or tube, is worse than useless, and only brings the whole method into discredit. The coil made use of in taking the accompanying skiagrams is one giving nominally a 12-in. spark, but when worked at high pressure is capable of giving a spark 14 in. in length. The secondary coil has some fifteen miles of wire wound in seventy sections. It is worked by two 4-cell accumulators of 21 ampère-hours capacity, and an electromotive force of 16 volts. The tube must be one of, technically speaking, sufficient hardness or penetrating power. So much for the apparatus.

The next most important points are, the time of exposure and the distance of the tube from the photographic plate. The time of exposure must necessarily depend a good deal on the patient. Age, sex, muscular development, fatness or thinness of the patient, must all be taken into account to obtain a successful result. Young patients and females will require a shorter exposure than adults and males. Very fat or very muscular persons will require a longer exposure than thin and emaciated individuals. As a rule, for thin patients, about one minute fifty seconds will probably be sufficient. For a very muscular patient, three or even four minutes may be required, always provided a 12-in. coil be used. With regard to the height of the tube above the photographic plate, a more stringent rule can be laid down. We must always remember that the nearer the organ to be skiagraphed is to the photographic plate, the sharper will be its shadow and the less its magnification. The further the organ is from the plate, the more blurred is its shadow and the greater is its magnification, the tube remaining immovable. All these points must be duly considered before drawing any conclusions from the picture, especially when working with the screen, in which case the tube must only be a few inches from the wall of the chest.

In taking a skiagram, however, after a certain distance is

passed, the height of the tube becomes a matter of less importance, as the following experiment will show.

Two coins of the same size were placed on the thorax of a skeleton, one on the posterior part of the ribs near the spine, the other on the edge of the sternum which was furthest from the plate. The shadow of the coin on the ribs, that is the one nearest the plate, appeared its natural size, the coin on the sternum was magnified somewhat, its diameter being about $\frac{3}{8}$ in. larger than the other coin. The tube was placed 4 ft. above the plate. With the tube only a few inches from the chest wall, as in a screen examination, the shadow of the coin on the sternum was of course much more magnified, nearly four times.

Allowing, then, for this magnification of the shadow, a good height to work at in chest cases is 4 ft. above the surface of the plate. One word with reference to the photographic plate. Nearly any make of rapid gelatin dry plate will do, only the more rapid the better. A good size for chest work is 10 by 12 in.

I will now pass on to the methods of examining the chest with the X-rays. They may be divided into three principal divisions—

1. Examination by the screen, or radioscopy.
2. Examination by the plate, or radiography.
3. Examination by the stereoscopic method, either by screen or plate.

We may subdivide these again into—

- (a) Examination from the front of chest.
- (b) Examination from the back of chest.
- (c) Examination by the lateral oblique method.

The method generally employed in making a chest examination is as follows:—

The patient lies on a couch in the prone or supine position, with the front or back of the chest resting on the plate, which is protected from breakage by being placed on a board. The tube, in a suitable holder, is placed in position above the chest, with the anticathode at right angles to the plane of plate. I usually employ the anterior method, but of course both may have to be used in examining for an aneurysm. The reason for this I shall return to later on.

If we wish to obtain a stereoscopic view of the chest, the procedure is somewhat different. But this method should always be employed in a case of suspected aneurysm of the aorta. We require a special apparatus, such as that invented by Mr. Mackenzie Davidson. It consists of a stout wooden frame covered with parchment.

An upright rod carries a horizontal graduated bar, on which the tube slides. This horizontal bar can be raised or lowered as desired. The patient rests with the chest on the parchment cover. The plate, enclosed in an opaque envelope, is placed under

the parchment, and kept in position by means of a lever and a screw. The horizontal bar is now placed at the required height above the chest, and the tube brought to the zero point, which is in the middle of the bar. The tube is thus brought vertically over the spine of the patient. The tube is now displaced 30 millimetres to the right of the zero point, and an exposure given of say two minutes. The current is then switched off, the plate removed, and another placed in position, without disturbing the posture of the patient. The tube is now displaced 30 millimetres to the left of the zero point, and another exposure of the same time as the former one is given. We have thus obtained two negatives of the chest, from two different points of view, 60 millimetres apart. When prints are taken from these negatives and placed in a Wheatstone's reflecting stereoscope, a stereoscopic effect is obtained. By this method we obtain the third dimension in space, which must obviously be of great importance in examining a chest for an aneurysm of the aorta. In this way we shall probably be enabled to localise an aneurysm to the part of the vessel from which it originates. The process may seem a complicated one, but is in reality extremely simple. The stereoscopic method can also be applied with the screen, after the very ingenious method of Mr. Mackenzie Davidson.

For the diagnosis of aneurysms of the descending thoracic aorta, the following method, recommended by M. Mignon of Nice, and also practised by Professor Holzrecht of Vienna, may be used, either with screen or plate. This is the lateral oblique method mentioned above. It is a well-known fact to all workers in chest radiography or radioscopy that a strictly lateral view of the chest shows nothing definite, but if a three-quarter view can be obtained, much may be learned of the condition of mediastina by this means. On the screen, by this method, one sees a clear zone of somewhat triangular form bounded as follows:—Below by the convex shadow of the diaphragm, in front by the shadow of the heart, behind by the shadow of the vertebral column, which shadow, of course, includes those of the aorta, vena cava, and œsophagus. M. Mignon proposes to call this clear zone the retro-cardiac triangle. There is another clear triangular space seen in front of the heart shadow corresponding to the anterior mediastinum.

Tumours originating in the anterior mediastinum, or aneurysms in the posterior mediastinum, can occasionally be well seen in this way. Any bulging of the vertical vertebral spinal shadow would indicate an aneurysm springing from the thoracic aorta or an œsophageal tumour, the rarity of the latter, however, making an aneurysm probable. I have tried this method in a few cases. The anterior triangular clear space is seen easily enough, but the shadows in the retro-cardiac triangle are more difficult; but I have seen this retro-cardiac triangle filled up with shadow in a case of enlarged mediastinal glands.

As with the stethoscope it is impossible to say if a murmur be present or not without knowing the normal sounds of the heart, so with the skiagram it is impossible to say if an aneurysm be present or not without a knowledge of the normal shadow of the heart and aorta. It will be well, therefore, to give an illustration of the heart and aortic shadows in a skiagram of a healthy adult (Plate IX. Fig. 1).

The chest is viewed from the front. We see well the shadow of the heart and aorta; the latter shadow may be traced nearly up to the manubrium sterni, where it is lost. The next illustration (Fig. 2) shows a projecting shadow to the left of the aortic arch, which might be easily mistaken for a commencing aneurysm of that vessel.

This shadow is frequently seen in cases in which we have no reason to suspect an aneurysm, and it is probably a normal shadow of the junction of the transverse with descending thoracic aorta. It is accentuated if the tube be placed a little obliquely to the plate. We must therefore be cautious in drawing any inference from this shadow. It is, however, always of small size.

It may be as well to say now a few words with reference to the danger of exposing the patient to the Röntgen rays. That a severe dermatitis may be produced by prolonged or repeated short exposure to the X-rays, is a fact beyond question. I have seen four cases where a bad X-ray burn was so produced; but in each of these the rays were used therapeutically. I have, in an experience of over five years, never seen any injury arise from the exposure necessary for obtaining a skiagram of the chest.

This danger has been completely obviated by the introduction of the large coils now in use, which thus enables us to make the exposure so short that any fear of setting up a dermatitis may be disregarded. I will now give three cases of aneurysm of the aorta which were first discovered by the Röntgen rays:—

CASE 1.—A gentleman, *æt.* 45, was sent to me by my colleague, Dr. Heron, for an X-ray examination of the chest. This gentleman had been seen by three consulting physicians in London. He had been under treatment for intercostal neuralgia. The physical signs were obscure. There was a little tenderness on percussion over the upper dorsal vertebræ. There was no dulness to be made out, no tracheal tugging, pupils equal. No cough, and only slight dyspnœa. But it only required, however, a moment's inspection with the screen to see that this gentleman had a large aneurysm of the thoracic aorta. A skiagram was taken, and the result is shown in Plate IX. Fig. 3.

CASE 2.—The next case was that of a woman, *æt.* 51, whom I admitted to the City of London Hospital for Diseases of the Chest, as long ago as 1897, with the signs of aortic regurgitation. She remained in the hospital eight weeks, and at the end of that time she was discharged considerably improved. She returned to the out-patient room towards the latter part of December of last year, saying she had

been in much the same condition, but the pain in the back, especially between the shoulders, had become much worse. She described this pain as if "a piece of broken glass were being scratched up and down the spine between the shoulders." As an X-ray apparatus had been installed in the hospital since the patient's first admission, I at once examined her chest with the screen, and had no difficulty in diagnosing an aneurysm of the descending thoracic aorta. I immediately looked up the in-patient notes, and found the physician under whose care the patient was placed when in hospital had diagnosed, like myself, aortic obstruction and regurgitation. I found such negative notes as these, "No tracheal tugging," "Cords move well," etc.

Of course it is an open question as to whether the aneurysm existed in 1897; all that can be said is, that at that time, as at this, it gave no physical signs of its presence. I anticipate that when the Röntgen rays come into more general use in the diagnosis of chest disease, aneurysms of the aorta will be discovered much earlier than they are at present. I think we may possibly find that the life of an aortic aneurysm is much longer than is usually supposed. As Sir Richard Douglas Powell very truly says,¹ "the commencement of an aneurysm of the aorta is unmarked by symptoms, and the disease may continue latent up to the time of death." I think, with such a means of diagnosis as the X-rays at our disposal, these cases will become rare. Such a case should go no longer undiagnosed.

The skiagram (Plate X. Fig. 4) was taken in December last, and shows the aneurysm of the thoracic aorta. The chest is viewed from the front.

CASE 3.—A patient, a woman, æt. 58, was admitted to the hospital under my colleague, Dr. Clifford Beale. She had been sent up from the country with the diagnosis of laryngeal phthisis. On examination of the larynx, the left vocal cord was found to be paralysed, which of course in itself was a very suspicious sign of an aneurysm. Nevertheless no other symptom or sign of aneurysm existed; it was only on a screen examination that a large aneurysm of the transverse arch was found (Fig. 5). The chest is viewed from the back.

I think the three above cases are almost enough in themselves to establish the usefulness of the rays in the diagnosis of thoracic aneurysm. I will, however, give one more case.

CASE 4.—A man, æt. 37, was admitted to St. Bartholomew's Hospital, under the care of Sir William Church. The diagnosis of an interthoracic tumour was made, and the case was sent to the Electrical Department for an X-ray examination of the chest.

The skiagram showed conclusively that there was a large aneurysm of the aorta. The patient is still under treatment.

For the diagnosis of an aneurysm the shadow must be in continuity with the heart or aorta. The shadow cast by an interthoracic new growth is quite different.

The skiagram of an aortic aneurysm (Fig. 6) was kindly lent

¹ Reynolds, "System of Medicine," vol. v. p. 29.



FIG. 1.



FIG. 2.



FIG. 3.



FIG. 4.



FIG. 5



FIG. 6.



FIG. 7.



FIG. 8.



FIG. 9.

to me by my friend Mr. Payne, who is in charge of the X-ray department of the Sussex County Hospital.

The difference between the density of the heart shadow and the shadow of the aneurysmal sac is well marked, the latter being much the denser of the two. This is an important point from a prognostic point of view.

We know that fluid blood is almost completely transparent to the rays. The greater the density of the aneurysmal sac, therefore the more abundant the laminated clot in the sac of the aneurysm, because clotted blood is comparatively opaque to the rays, so the density of the shadow has some prognostic value.

Now, a word with reference to the position of the heart in some of these cases. Plate XI. Fig. 7 is from a skiagram of the chest of a gentleman who was seen, I think, by nearly all the consulting physicians in London. The skiagram only shows the sac of the aneurysm. Post-mortem, the heart was found lying nearly transversely in the chest, as if pressed into that position by the super-incumbent weight of the sac of the aneurysm. I have noticed on three or four occasions, when examining with the screen, this transverse position of the heart in cases of aneurysm of the aorta.

This position of the heart is, I think, a very important sign of aortic aneurysm, and one not sufficiently insisted upon. For instance, a man, *æt.* 51, came to the out-patient room complaining of pain in the back between the shoulders, and dyspnœa of three months' duration. On examination, he was found to have well-marked signs of aortic regurgitation. There was no pulsation to be felt on the chest wall, no dysphagia, no cough, no cord paralysis, no definite tracheal tugging, the pulse was collapsing but equal on each side. The apex beat was displaced somewhat outwards but not downwards, as one would have expected from the amount of regurgitation, as judged by the pulse. On percussion, the heart was found to be lying almost transversely in the chest. There was also very marked epigastric pulsation. This case, excepting the position of the heart, might have been passed as one of simple aortic regurgitation. On a screen examination, however, the patient was found to have an aneurysm of his aorta. One was induced to look for an aneurysm by this transverse position of the heart.

If space permitted, there are many more cases of aneurysm of the thoracic aorta, which I have examined by the X-rays, which I should like to give, but I must be content.

I will now pass on to a case of probable cardiac aneurysm; I say probable, because the patient is still under observation, and cardiac aneurysms are confessedly of rare occurrence.

CASE 5.—A man, *æt.* 33, came to the out-patient room complaining of dyspnœa and a "cramp-like feeling" in the region of his heart. There was a specific history of fifteen years ago. In the third and

fourth interspaces on the left side, $3\frac{1}{2}$ in. from the mid-sternal lines there was a diffuse area of pulsation, over which a systolic murmur was audible. The aortic and pulmonary second sounds were clear; at the apex there was a systolic murmur following the first sound. The expansion of the left side of the chest was a little less than the right. The breath sounds all over the left side of the chest were a little weak. Numerous crepitations were heard over the left base behind, pupils equal, no tracheal tugging. Both cords moved well. The pulse was 72, regular and equal on each side. The patient was admitted under the care of Dr. Eustace Smith.

Illustrations 8 and 9, Plate XI., are skiagrams of this patient's chest. Fig. 8 was taken on his admission, Fig. 9 one year after. The chest is viewed from the front. There is a projecting shadow from the left base of the heart corresponding in position to the left auricle, and if aneurysms of this chamber of the heart were not so extremely rare—there being, I believe, only a few cases on record—we might suppose that this shadow was produced by an aneurysm of this chamber of the heart. The tumour was seen plainly pulsating with the screen. It is gradually increasing in size, as shown by the second skiagram. The patient is still under treatment.

Much still remains to be done to perfect this means of diagnosis of cardiac and aortic aneurysms, but I hope, in this short paper, I have sufficiently established the diagnostic power of the X-rays, to induce physicians to use them in addition to the other methods of physical examination at their disposal.

All the skiagrams of the chest are viewed from the front, with the exception of Fig. 5, Plate X., in which the chest is viewed from the back.

OSTEOMALACIA.

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(PLATE XII.)

THE main interest attached to the disease known as osteomalacia is doubtless obstetric in character, and apart from the chapters in obstetric works which deal with the causes and varieties of contracted pelvis, our text-books contain little information on the subject. There is, however, a large amount of recent literature dealing with this disease which is of interest from the physician's point of view, and the object of the present paper is to briefly discuss the condition from this standpoint, and to illustrate it by the record of an example of the disease which has been for a long period under observation.

The first symptom of the disease is generally pain in the sacrum, pelvic bones and spinal column, which, though continuous, is increased on movement and by pressure. Examination on the appearance of these symptoms often reveals increased knee-jerk and ankle-clonus. Muscular tremors are frequent, and difficulty in standing with the eyes shut, with various other nervous symptoms, have often been observed. Muscular weakness, like the nervous symptoms, is an early feature of the disease, and is of general occurrence. It is partly to blame for the difficulty in walking of which the patient begins to complain after the pain has lasted for some time. As the disease advances, certain bones soften and bend, the alterations in their shape depending on purely mechanical principles, and the pelvis, as a rule, being first attacked. The body weight reaches the pelvis by the sacrum, the resistance of the ground being transmitted through the acetabula, and the pressure at these three points produces the well-known "beaked," "triradiate," or "rostrate" pelvis of obstetricians. The pelvic deformity alters the relationships of the origins and insertions of the muscles which act on the hip-joint; and this, together with muscular weakness, renders the patient unable to flex the thigh, and so lift the foot. This is accordingly done by swaying the body from side to side, which produces the characteristic waddling gait. The spinal column may become bent in various ways, thus reducing the height of the patient. Softening of the ribs permits of alteration in the shape of the chest, whose sides are pressed together by the weight and movements of the arms, so that the sternum is thrown forward. Incurving of the angles of the scapulæ is sometimes noted; and, lastly, the long bones may become affected so that they are bent, or occasionally fractured. The disease is generally progressive, and gradually renders the patient bed-ridden, but spontaneous arrest may occur at any stage, even after the condition has lasted for many years.

The nervous, muscular, and osseous systems are the only ones directly affected. The nervous system has not been sufficiently often examined post-mortem; no gross lesions have been found; but Pommer, Renz, and others have found distinct though slight changes in the cord by histo-pathological methods. The affected muscles show fatty degeneration, multiplication of nuclei, and changes similar to those observed in progressive muscular atrophy. In the bones there is first congestion of the periosteum and of the medullary vessels, followed by enlargement of the medullary canals. The bone becomes more cancellous, the inorganic matter is removed from areas surrounding the Haversian canals, which enlarge concentrically. Osteoclasts are found in the areas where absorption is going on, and, following the removal of the salts, the organic matter of the bone is also absorbed. Repair is observed along with and often near to the

destructive process. In some cases the organic matter is first attacked, the bones becoming fragile though remaining rigid, instead of, as is the rule, becoming soft, so that they can be cut with a knife. In typical osteomalacic bone the organic matter weighs twice as much as the inorganic, a reversal of the conditions obtaining in normal bone. The process is not inflammatory. Lactic acid has been found in the urine, but is as often absent; indeed, it is only in certain cases that the urine is more acid than usual. While the disease is active, the alkaline phosphates excreted are largely, and the earthy phosphates somewhat increased. Observations of the urine, though numerous, have given as yet very various, contradictory, and valueless results. The blood has also been frequently examined. It has been found decreased in alkalinity, and various alterations in the relative frequency of the different kinds of white corpuscles have been recorded. There is, however, no unanimity or value in the records. Some degree of anæmia is present as a rule.

Osteomalacia is much more common in women than in men, although numerous cases of its occurrence in the male sex are recorded.

The disease generally commences during the period of sexual activity. A few cases, however, have begun before puberty, and some after the menopause. Bury has reported a case of osteomalacia in a young child.¹ A considerable proportion of the recorded cases have occurred in nulliparous women of child-bearing age. Pregnancy, especially if frequently repeated, favours the progress of the disease, which is often first recognised during an exacerbation accompanying gestation. About 74 per cent. of the recorded cases have occurred in child-bearing women, the remaining 26 per cent. being divided between men and nulliparous women. Lactation also favours the advance of mollities ossium.

The condition is common in certain parts of Italy and Switzerland; in Bavaria, Würtemberg, Baden, and Alsace. While known in Austria, it is rare in North Germany, Russia, France, and Great Britain. Only a very few cases have been reported in America.

Before leaving the region of facts for the more theoretical aspects of the subject, I submit for illustration the history, up to the present time, of a sufferer from osteomalacia:—

CASE 1.—Mrs. B. is a married woman, æt. 48, of Polish extraction; she was born in Hamburg, but came to England at the time of her marriage, when she was æt. 20. She has always had comfortable and healthy surroundings, and has never suffered want. Her family history presents no feature of interest, and her own health was always good before the beginning of her present illness. Menstruation began at the age of 18, and was regular and normal in habit (pregnancy and lactation apart) until ten years ago. She has had nine labours, eight ending in

¹ *Brit. Med. Journ.*, London, 1884, vol. i. p. 213.

the birth of living children, all of whom she suckled, except the last. Five children still survive. Her first labour was instrumental, but the next four were natural. Towards the end of the sixth pregnancy she began to suffer pain in the hips and legs, and discovered that she could not walk easily. The sixth labour was again instrumental. The seventh confinement was instrumental, the child being born alive. It was followed by slow improvement; she became free from pain, but muscular weakness and difficulty in walking remained. During her next pregnancy (two and a half years later) the pain in the hips and legs returned, and was accompanied by pain in the sacral and lumbar portions of the spine and also in the arms. At the confinement (her eighth) she was delivered of a dead child with some difficulty. Considerable improvement again followed, and she was able to walk without sticks. She conceived again, and the usual symptoms returned. Her ninth labour at term began on August 29, 1890, and she was admitted that day to the Manchester Maternity Hospital. A full account of her delivery is given in Professor Sinclair's paper on "Ten Successful Cases of Cæsarean Section,"¹ from which I quote. "On examination, the patient's general appearance was good. She was well nourished and the breasts were large. On palpation, the height of the fundus was found to be the ensiform cartilage. The uterine tumour was very prominent. The conjugate diameter of the true pelvis was about $2\frac{1}{4}$ in. All proportions were lost. The rami of the pubes came so close that the index-finger could only be inserted into the arch." Dr. Sinclair performed Porro's operation, the ovaries and tubes being carefully removed separately from the uterus. Patient and child both did well, and after leaving hospital the mother improved in condition until she was quite free from pain and could walk without sticks. She neglected to wear her abdominal belt, however, and accordingly developed a large ventral hernia. She remained fairly well for about six years, but noticed alteration in the shape of her body. She lost in height, and became, as her friends remarked, very "short-waisted." Three years ago pain returned in the back and legs. It became very severe, and spread to the arms and chest; she began to suffer from bronchitis, and finally became bed-ridden. On May 10, 1900, she was admitted to the Clinical Hospital for Women and Children, on the recommendation of Dr. Richardson of Manchester. She was then 4 ft. $3\frac{1}{2}$ in. in height, having lost over 9 in. in stature during the course of the disease. The bones of the limbs were not affected. The shape of the thorax was much altered, the lower ribs being very prominent in front, especially on the left side. The back was very rounded, and the ribs were markedly bent before and behind, while flattened at the sides; the sternum being thrust forward so that the antero-posterior diameter of the chest was much greater than the lateral. At the level of the sternal junction with the fourth rib the chest measured $10\frac{1}{2}$ in. (nearly 27 cms.) from back to front, and 9 in. (23 cms.) from side to side. When the patient was in the erect posture, the costal margins on each side dipped within and below the iliac crests, the lower portion of the thorax fitting into the false pelvis (Plate XII. Fig. 1). When lying down this was not so marked, as a finger could be slipped between the ribs and the crests on either side. The abdominal

¹ *Lancet*, London, January 19, 1901.

wall was flaccid, and showed the scar from the operation. A ventral hernia, which was easily reducible, was presenting just to the left of the umbilicus, so that its sac occupied the lower portion of the left half of the abdomen.

The external measurements of the pelvis were as follows :—

Interspinous	diameter	.	.	9 $\frac{1}{4}$ in. (23·5 cms.)
Intercristal	"	.	.	10 $\frac{3}{8}$ " (26·3 ")
Intertrochanteric	"	.	.	11 $\frac{3}{4}$ " (29·9 ")
External conjugate	"	.	.	7 $\frac{3}{4}$ " (19·7 ")

The false pelvis was not so much deformed as in many cases, and the ilia had not assumed the so-called "sugar-scoop" shape. Vaginal examination did not afford much information, as the vagina itself was very much contracted, and the pubic arch was narrowed to half an inch at a point midway between the symphysis (lower margin) and the tubera ischii, which were about 4 in. apart.

She complained of pain in the hips, back, chest, and arms. When she attempted to stand, which she could not do without support, she also felt pain in the legs. Her suffering was increased by movement, but not markedly by pressure. The hernia caused her considerable inconvenience, and she also had chronic bronchitis and emphysema. Her urine and her blood were examined, and were not in any way peculiar. Both knee-jerks were slightly increased; there was no ankle-clonus. In Plate XII. Fig. 1 the scar and the umbilical hernia are well seen. Figs. 2 and 3 show the relation of the thorax to the pelvis. Fig. 3 shows the antero-posterior enlargement of the chest and the bent spine. A belt was constructed which controlled the ventral hernia, and the bronchitis was relieved by appropriate treatment, while attempts were made to improve her general condition. She took cod-liver oil and syrup of hypophosphites alternately after going home, and she has since been able to get about again. I saw her, with Dr. Richardson, on February 7, 1901, when she opened the door to us herself, and moved briskly about the house, steadying herself occasionally by grasping the back of a chair or the edge of a table. She uses sticks when walking out of doors. She informed me that cod-liver oil has done her more good than anything else, and she continues to take it in considerable quantities. She has put on flesh, and has greatly improved in muscular strength, but still has some pain, especially in the knees and elbows, which varies with the weather, and appears to be rheumatic in nature.

Turning from matters of fact and observation to consider the theories which have been brought forward to explain the causation of osteomalacia, we find that these are numerous—so numerous as to suggest that they are all unsatisfactory. The suggestion that a micro-organism is to blame may be dismissed as being quite unsupported by evidence. The theory that the ovaries and uterus form a source of reflex irritation which causes a tropho-neurosis of the bones, is negatived by the facts that the disease can occur in men; that it may persist after both ovaries and uterus have been removed; and that, in many cases, recovery has occurred without

the removal of ovaries or uterus. Frequent pregnancy is so much commoner than osteomalacia, that it can by no means be regarded as a cause of the disease. Prolonged lactation also is the universal custom in some countries where mollities ossium is practically unknown, as for instance in Japan, where it is not uncommon to suckle children for three or four years. Climate, food, water, and other factors of environment have also been suggested as causes, but these can be found in every combination without any resulting osteomalacia. Indeed, repeated pregnancy, prolonged lactation, starvation and exposure, are of practically universal geographical distribution, while that of osteomalacia is distinctly limited.

Supposed alterations in the chemical constitution of the fluids of the body form the basis of another large group of theories. Lactic and other acids have been said to act as solvents of the bone salts, and experiment upon animals has shown that, under certain circumstances, softening of the bones can be produced by the ingestion of acids. It must be stated, however, that careful observation in cases of undoubted osteomalacia has not as yet indicated that any of the "altered chemistry" theories are in accordance with facts. These theories also fail to explain the destruction of the organic portions of the bone in osteomalacia, the removal of inorganic matter being only one element in the change observed during the course of the disease.

The view which is most in accordance with fact is that which finds the explanation of the disease in a primary affection of the central nervous system, probably beginning in the nerve cells of the anterior cornua of the cord. The early appearance of nervous symptoms points in this direction, and an interesting parallel is found in the bone changes of Charcot's disease. A non-inflammatory lesion of the cord involving lowered vitality, increased irritability, and perverted function, would be made worse by privation, exposure, pregnancy, and lactation, and would be improved by good dietetic and hygienic conditions, and also by the suppression of the reproductive functions after removal of the ovaries. The limited distribution of the disease is explicable as due to heredity if the primarily nervous nature of the condition is accepted, for nervous disease is notoriously easy of hereditary transmission.

The case described above illustrates this view in several ways. Thus the patient never inhabited a district where osteomalacia is endemic, so it could not be caused in her case by local food, climate, habits, or surroundings. But she is descended from Polish people, whose home is one of the homes of the disease, which would show that, in her, the disease is inherited rather than acquired. She has not experienced want or exposure, so that these cannot be blamed in her case. Nor indeed can her repeated pregnancies be considered as more than adjuv-

ant; for the symptoms appeared during her sixth gestation, and a family of six cannot be regarded as an unusual feature in the history of a patient. Again, the removal of her ovaries and uterus, though followed by improvement, did not prevent a serious and prolonged relapse, during which her deformities, apart from those in the pelvis, mainly appeared. Lastly, she again improved under medical treatment. This, therefore, is a case which affords negative evidence against the endemic, the dietetic, the hygienic, and the ovarian theories, and positive evidence in favour of the hereditary, and therefore more probably nervous, origin of the disease.

The early diagnosis of osteomalacia is not easy. Cases seen before deformity has been produced are either mistaken for rheumatism, or are regarded as spinal disease. The latter is, of course, a correct diagnosis, if the view above indicated be accepted, the particular form of spinal disease which is present becoming evident as the case progresses. Cases of so-called osteomalacia carcinomatosa have been mistaken for true osteomalacia, in the absence of a history or of signs of primary malignant disease.

The prognosis in osteomalacia is now much less gloomy than it was some few years ago, several lines of treatment having been rewarded with success. Bone marrow, cod-liver oil and phosphorus, used with patience, are found to be the most useful drugs. Diet and hygiene are important factors in management, while salt water and other baths have proved very valuable in aiding metabolism.

The surgical treatment of osteomalacia has arisen naturally from the performance of the Cæsarean section as an emergency operation at full term. In most of the earlier cases Porro's operation was done, and as improvement or cure was frequently seen to follow, it was judged that the benefit derived from the operation was due to the removal of the ovaries. Accordingly, in 1887, Fehling¹ began removing the ovaries with a view to curing osteomalacia, quite apart from pregnancy, and double oöphorectomy has become a recognised treatment for the disease even in women who have never been pregnant. Winckel² mentions forty cases in which the ovaries were removed; of the sixteen which were observed for some time, twelve were cured and four improved, but he does not consider the results to be definite. Truzzi³ published in 1894 a table of ninety-eight operations, fifty-two of which were subsequently traced. There was complete cure in thirty-six; partial cure in four; cure after relapse in three; improvement in three; persistent relapse in five; and no change in one.

¹ *Arch. f. Gynäk.*, Berlin, 1895, Bd. xlviii.; also 1891, Bd. xxxix.

² *Samml. klin. Vortr.*, Leipzig, 1893, No. 71.

³ *Ann. di Ostet.*, Firenze, 1894, tomo xvi.; also *Ann. de gynec.*, Paris, 1894, tome xli. See also Ritelli, *Trans. Edin. Obst. Soc.*, vol. xxi., whose paper contains Truzzi's table and a valuable bibliography of the whole subject.



FIG. 1.—Note scar and ventral hernia, bulging forward of thorax, and dipping of the lower part of thorax into the false pelvis. Limbs not affected.



FIG. 2.—Note the lower ribs in contact with the iliac crests



FIG. 3.—Note curving of spine and great antero-posterior enlargement of thorax.

Some authorities hold that the removal of the uterus together with the ovaries gives an additional chance of success, but this has also been followed by failure. It seems unlikely that the surgical treatment of osteomalacia, as apart from pregnancy, will become general; indeed, it has probably passed its perihelion, and will soon be less fashionable than it now is. The consensus of present opinion as to the management of osteomalacia may be briefly indicated.

1. In men and in non-pregnant women, internal medication should always be patiently tried, together with hygienic and dietetic precautions. In females, if the disease continues to progress, double oöphorectomy may be performed, and followed up by continued medication.

2. In early pregnancy, induce abortion and then treat as above. If a living child is specially desired, and the symptoms are slight, pregnancy may be allowed to continue, medical treatment being continued throughout.

3. In late pregnancy it is necessary to decide whether or not a living child can be born at term *per vias naturales*. If not, a choice must be made between the induction of premature labour and a pre-arranged Cæsarean section, as embryulcia should not be contemplated.

4. During labour, the child, if living, must be delivered alive by the method indicated by the circumstances of the case. If the abdomen is opened, the ovaries are removed, whether the uterus is also removed or not. Embryulcia is permissible only when the child is dead. Medical treatment must be continued after operation, as relapses frequently occur.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

Cancer of the Uterus, its Pathology, Symptomatology, Diagnosis, and Treatment. By THOMAS STEPHEN CULLEN, M.B. New York: D. Appleton & Co.

THROUGH the whole of the century which has just closed, the subject of cancer has occupied the minds and pens of the most able workers. It is perhaps since Waldeyer in 1878 conclusively showed that all carcinomata owed their development to a proliferation of epithelium, that the literature of carcinoma of the uterus has reached such colossal proportions. If we consider its great and unquestionably growing prevalence (perhaps every general practitioner sees two or three cases every year), the suffering it involves, its inevitable issue, and the unsatisfactory nature of our methods of dealing with it, it is no wonder that the labourers have been many and able, and the output excessive. To Howard Kelly and his colleagues in Johns Hopkins Hospital, gynæcology owes a profound debt of gratitude, and from the same hospital comes this splendid work of Cullen's on cancer of the uterus, which maintains the reputation of the institution with which he is connected, and enhances his own. An excellent and necessary chapter on the normal anatomy of the uterus, in which the histological appearances of the uterine mucosa (so intimately associated with cancer) are very clearly dealt with, brings the reader to indispensable instructions as to the removal and examination of uterine tissue. I am sure I have seen unfortunate consequences arise, both in hospital and private homes, from careless manipulation of specimens, and therefore Dr. Cullen's advice is important, "If one is not sure about specimens, it is always better to throw them away at once, though it be necessary to curette again." To mix up a specimen of early cancer with hypertrophy of the mucosa has obviously only too serious results, and this mistake I have known to occur twice.

Dr. Cullen has adopted a simple but at the same time a comprehensive classification of uterine cancer:—(1) Squamous-cell carcinoma of the cervix; (2) adeno-carcinoma of the cervix; (3) adeno-carcinoma of the body; (4) squamous-cell carcinoma of the body (rare).

A very full and exhaustive account is given of squamous-cell carcinoma of the cervix, which is, of course, the most common variety of uterine cancer. The macroscopical appearances of the condition, in its three degrees, with numerous illustrative cases, are described with great exactitude. The microscopic structure is described in great detail, and equally well illustrated. The clinical aspects of the condition are described, but, as the author himself admits, the space allotted to symptomatology is very small. In explanation of this, he makes the following suggestive remark—"We find that diagnostic symptoms at best are meagre, and in the early stages give little or no clue to the real nature of the disease. Hence the value of curettage, when there is the slightest uterine hæmorrhage that cannot be satisfactorily explained,"

The author gives a very elaborate and extensive description of the differential diagnosis in squamous-cell carcinoma of the cervix, and this chapter is well worth careful perusal.

Abdominal hysterectomy, after the plan of Werder, is advocated by the author in all cases where the patient is not too stout. This operation has not, however, been much practised here, and although it is a praiseworthy and very interesting method of saving infection, it remains to stand the test of time.

It is not to be wondered at that, issuing from the Johns Hopkins Hospital, where this is a speciality, very careful instructions should be given with regard to the ureters. Catheterisation of the ureters is, alas, not so easy a matter. The description of vaginal hysterectomy, as practised by Howard Kelly, is as nearly perfect as can be, and the honest and careful way in which the risks and accidents attending the operation are described and illustrated, with cases, are to an operator interesting and most instructive.

The remote results of the operation, whether abdominal or by the vaginal route, are not so remarkable. They are most honestly and fairly recorded, and as such they are worthy of great consideration and are of much value. Nothing does more for the furtherance of surgery than a straightforward record, such as Dr. Cullen produces. Vaginal hysterectomy, whether by the method here advocated, or by Doyen's method, is a comparatively safe and easy operation immediately, but the remote result is quite another question, and Dr. Cullen's report of his cases is most important and to operators must be carefully considered. I believe the results attained by the operators at Johns Hopkins are the best attainable, and these must be examined by each individual operator. It is too large a question to be discussed here. Early operation will always be the great desideratum, but in uterine cancers, unlike the mamma, this will always be unattainable, for the early diagnosis, as Dr. Cullen admits, is always uncertain, but even in advanced cases Dr. Cullen's results have been fairly successful. It is very satisfactory to find that Dr. Cullen warns against the pernicious idea of operating where the removal cannot be complete. It is bad enough to have the disease returning in the peritoneum after a so-called complete case, but it is inexcusable after an incomplete operation.

One of the many admirable features of this book is, that the whole of the facts deduced are entirely from the author's own material. The work is founded upon an examination of 182 cases—128 were of so-called squamous-celled carcinoma of cervix; nineteen, adenoma carcinoma of cervix; thirty-five, adenoma carcinoma of body of uterus.

There is no compilation; the whole work is produced from cases diagnosed, operated on, and microscopically examined by himself. There can be no doubt about the fact that the exhaustive descriptions of each case clinically, and the minute and carefully described post-mortem appearances, add vastly to the worth of the volume. Few books are better or more profusely illustrated. The lithographic plates, and the copious coloured and black illustrations and letterpress which accompany them, are beyond all praise. How disappointing, as a rule, are black and white illustrations of operations—indefinite, indistinct, confusing. This is not so in this work; for instance, the illustration of

the operation for hysterectomy, or the removal of the lymph glands in the radical operation for cancer of the uterus—nothing could be more clear and life-like; every step can be followed with minute accuracy.

With regard to etiology, he contends, and rightly, that heredity plays a very minor rôle in the production of cancer. Traumatism cannot be eliminated as a potent factor, though this may not, and probably does not, apply to carcinoma of the body of the uterus; yet when one finds that nearly all the victims of squamous-cell carcinoma of the cervix have borne children, the injuries of labour can hardly be excluded as a powerful influence. From a careful examination of his own cases, he arrives at the conclusion that there is no evidence of the embryonic origin of cancer. He discusses and dismisses Ribbert's theory as well as the parasitic origin of cancer, and arrives at the disappointing though foregone conclusion that etiology is still an unknown and unsettled question. We know that it is primarily a disease of the epithelium, but we are as ignorant as ever of the cause of this cell alteration. In cases where cancer complicates pregnancy, and which are inoperable, the author recommends Cæsarean section, followed by Porro.

Dr. Cullen discusses very fully that interesting condition first described by Sanger as deciduoma malignum, illustrating it by a case from *Johns Hopkins Hospital Reports*; he arrives at the conclusion, "It is impossible to decide whether the growth be a carcinoma or a sarcoma, or a combination of the two processes. The clinical features alone are sufficient to class it as a morbid process distinct from ordinary carcinoma or sarcoma." He adheres to the name deciduoma malignum.

The volume appeals alike to the gynæcologist and practitioner.

J. HALLIDAY CROOM, M.D.

A Text-Book of Pharmacology and Therapeutics, or the Action of Drugs in Health and Disease. By ARTHUR R. CUSHNY, M.A., M.D. (Aberdeen), Professor of Materia Medica and Therapeutics in the University of Michigan. Second Edition. London: Rebman, Limited.

DR. CUSHNY'S book may be most strongly recommended to any one who wishes to have a complete account of present-day pharmacology within a reasonable compass. The author is known as an able and indefatigable worker in this field, well qualified by his researches, by his experience in teaching, and by the extent of his reading, to compile an authoritative text-book for his own students, as well as for the much wider circle of his professional brethren. Having done so, the result, so far as the description of the actions of drugs is concerned, may unhesitatingly be pronounced an unqualified success, each article being clear, easily followed, and tersely put. The best literature has been freely drawn upon, and the author has throughout wisely refrained from elaborate discussions or detailed balancing of evidence regarding any special points still in dispute. Dr. Cushny has avowedly taken as his model the *Grundriss der Arzneimittellehre* of Professor Schmiedeberg, whose arrangement and methods are closely followed, and whose somewhat stand-off attitude towards therapeutics is maintained throughout. Both authors regard the practical use of drugs in disease from the standpoint of the laboratory rather than of the bedside, and hence the sections which treat of the therapeutical applications of remedies are

often extremely brief and almost entirely lacking in detailed information and the vividness of personal experience. These shortcomings, if such they be, will lessen to a certain extent, perhaps, the immediate influence of the book in practice; but such a work, if widely read, is eminently calculated to have an educative effect on our ideas regarding the curative value of medicines, and the limits of their usefulness in disease. Dr. Cushny, however, takes a sanguine view of the future of his subject, as is made evident from his expressed opinion that "the period of constructive pharmacology has scarcely dawned; at present its chief function is destructive and critical." This may or may not be true, but even on the most hopeful survey of the present situation it does not seem likely that pharmacology and therapeutics will be very speedily put on the exact and scientific footing to which Dr. Cushny looks forward, and meanwhile it may not be wholly unprofitable to preserve and record the merely empirical knowledge of the past and present. As regards the general arrangement and classification of drugs, it cannot be said that the author has been more fortunate than other systematic writers; but the difficulties of an exact and logical classification of remedial agents are very great, and, for the present at least, practically insuperable.

The volume is well printed, and there is an excellent and carefully selected bibliography attached to each article. RALPH STOCKMAN.

A Manual of Physiology. By Professor G. N. STEWART, M.D., Western Reserve University, Cleveland. Fourth Edition. London: Baillière, Tindall & Cox. 1900.

THIS well-known text-book has passed into its fourth edition, and as only five years have elapsed since it made its first appearance, and the field which it covers was then and has since been covered by numerous other works of the same description, it must be regarded as one of the successful competitors in the race for a large student clientèle. That it has been so much appreciated is strong testimony not only in its own favour, but also for the good taste of the student reader, because, although this is expressly what the author does not aspire to, it shows evidence on every page of an originality in at least explanation and demonstration which is often absent in other books of the same class. One outstanding feature of the text-book is the inclusion of practical exercises explaining or amplifying what is given in the text. These are on the whole exceedingly well described, especial care being taken to emphasise what might at first sight appear to be trivial practical details, but are in reality absolutely essential for the success of the worker. The author takes up, where it is possible at least, a definite standpoint, so that the reader is not wearied with the narration of a multitude of theories. It is especially in those parts of physiology which require a physical treatment that one is most struck by the clear simplicity of the description, for example on diffusion and osmosis, electro-physiology, and physiological optics. In those parts of physiology where diverse opinions are held, and where at present it is impossible to hold dogmatic views, as for example on renal secretion, the author has excelled himself in a judicial statement of the principal theories. The chapter on the central nervous system

has been much amplified, the author having made ample use of Barker's excellent book. Altogether the book is one to be strongly recommended as not only a reliable guide for students, but an exceedingly interesting and original work, treating of the physiological problems which meet one in every domain of medicine. I may say that the treatment of Pflüger's law is not the usual one, but is in all probability correct, although no exact description is given of the method of testing conductivity as opposed to excitability. There is a very peculiar description of what the author terms Helmholtz's wire on p. 542. It would be as well to put in a short circuiting key in the secondary, which is absent in Fig. 223, although described in the text. T. H. MILROY.

A Short Practice of Gynæcology. By HENRY JELLETT, B.A., M.D., etc.
London: J. & A. Churchill. 1900.

FOLLOWING his "Short Practice of Midwifery," Dr. Jellett has published, under the above title, an excellent concise account of gynæcological diseases and their treatment. In limiting himself to the description of those theories and practices which appear to him to rest on the surest base in the present state of gynæcological knowledge, the author has adopted the only course which can be followed with success in writing a small book on a large subject. As his judgment has been good in matters of theory and practice alike, the result is a most readable and very useful little work. Methods of diagnosis are dealt with in a short preliminary chapter, and the bulk of the book is divided pretty equally into two parts—the first giving a short systematic description of "the diseases of women," while the second discusses the operations of modern gynæcology. These latter are so numerous that the space devoted to each is of necessity short; but the text is clear and intelligible, and is illustrated by numerous good diagrams. The matter is conveniently arranged, and with a good table of contents and a useful index, reference to any detail is easy. The author mentions in his preface that "the practice taught in this book is the practice of the Rotunda Hospital." This, however, appears to be identical with that followed in many similar institutions, and therefore the book will doubtless be in request outside as well as within the Dublin school. W. E. FOTHERGILL.

Paralytic Deformities of the Lower Extremities. By NOBLE SMITH, F.R.C.S. London: Smith, Elder & Co. 1900.

"THE object of this small work is to review the general aspects of paralytic deformities of the lower extremities, and to discuss the questions which may arise in deciding as to the most effectual treatment to adopt." We are inclined to wish that the author had confined himself to the recording of clinical cases, for this is the only valuable feature of the book; the various forms of paralytic deformity of the lower extremities are exceedingly well illustrated, with good photographs of the patient before and after treatment. The author's general observations are for the most part superficial and incomplete, as for example his account of the transplantation of tendons, while in certain sections of the work they chiefly consist of quotations from text-books on neurology. ALEXIS THOMSON.

Operative and Practical Surgery for the use of Practitioners and Students. By THOMAS CARWARDINE, M.S., F.R.C.S. Bristol: John Wright & Co. 1900.

THE author's intention, as stated in the preface, was to produce a book which should lay stress upon all such practical points as are likely to demand the care of the student and general practitioner, whilst the operations which fall as a rule within the province of the consultant were to be treated in outline. The idea is excellent, and there certainly is a demand for a book which should be more extensive in scope and treatment than the minor surgeries now before the public, and yet should not be merely an epitome of the larger operative surgeries and text-books.

In his preface, he tells us that he has dealt fully with certain subjects of everyday importance. "For others which are included in the usual courses of practical surgery, such as amputations and the ligature of arteries, a short style of description has been adopted on the lines of specific instructions."

The author, however, has not quite kept within the limitations he set himself, and the practical character of the work suffers from the fact that the space devoted to the larger operations of surgery has encroached unduly on that devoted to such manipulations as fall frequently to the student and practitioner.

The treatment of fractures and dislocations is given clearly and concisely, and the necessary manipulations and descriptions of apparatus required can be very readily followed. But it is chiefly in the case of some of the commoner emergency operations that this book fails from the practical standpoint. In a work of this character, one would expect to find the procedure clearly laid down for the treatment of such conditions as retention and extravasation of urine. But whilst the separate operative proceedings are described, including such difficult ones as Whitehead's and Cock's operations, the practitioner is left to choose between them, and such a simple and effective method of treatment in certain cases of urethral obstruction as suprapubic puncture and drainage I failed to discover. In the paragraphs devoted to transfusion, the details are insufficient for the novice. Again, more might be added with advantage on the subject of tracheotomy and its subsequent treatment.

Looked at from another point of view, namely, that of the student who wishes a good clear account, shortly described, of the various manipulations of surgery, the work may be regarded as an excellent one. The accounts are lucid, the leading features of each operation clearly laid down, and the numerous original illustrations satisfactory. To students the book will be found a great help, and can be warmly recommended. Some stress has been laid in this review upon what may be regarded as a departure from the author's original intention in regard to his book, simply because those aims were so excellent. When fully carried out, the author will have given us a work which will be of the greatest use. I hope, therefore, that in the next edition he will see his way to curtail the volume in certain directions, writing up such parts especially as are likely to be of practical use in all ordinary cases of emergency.

G. BELLINGHAM SMITH.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

A. LOCKHART GILLESPIE, M.D., F.R.C.P.Ed.,

MEDICAL REGISTRAR, EDINBURGH ROYAL INFIRMARY.

CORPOREAL SPECIFIC GRAVITY.

AN interesting paper by Stern on the value of the determination of the specific gravity of the body in physical diagnosis, appears in the *Med. Rec.*, N. Y., for February 9, 1901. Unfortunately, as this can only be arrived at with any degree of accuracy by the employment of elaborate apparatus, it scarcely becomes of practical use. Most of the life insurance offices in America seek to consider the relation of body height to body weight on a fixed standard; each centimetre of height corresponding to 446·45 grms. of body weight, or 2·5 lb. for every inch; 15 per cent. under and 20 per cent. over this standard being conceded to otherwise healthy lives. Stern recalls Jaeger's recommendation in 1878, that more stress might profitably be laid on corporeal specific gravity in connection with clinical diagnosis, for it is the density of the organs and tissues, not their absolute weight, which betokens sound or diseased conditions.

Jaeger deduced the body volume from a series of measurements, and claimed sufficiently accurate results by this method for comparison between a number of persons. Stern has followed Archimedes. By suspending the body in water, ascertaining the loss of weight it sustains under such circumstances from the normal absolute weight, and dividing the latter by the former figure, the specific gravity can be obtained; or, and this more easily, the weight of the body, divided by the absolute weight of water displaced by it on total submersion, yields almost identical results. Thus an individual weighing 64 kilos displaced 59·75

kilos of water; $\frac{64}{59.75} = 1.071$ forms his volume weight, or nearly $\frac{1}{14}$

more than water. In connection with the corporeal density, Stern investigated the specific gravity of the blood also. Numerous records already exist as to the normal blood density values. Stern's average figures—1·057 to 1·0635 in healthy adult males; 1·051 to 1·061 in adult females—agree very fairly with them. Contrasted with the corporeal values for the same individuals, a practically constant correspondence occurs; the higher the blood density the greater the body gravity, and

vice versa. Working out his figures, the factor 1.09 is apparent; multiplying the number in excess of 1.000, representing the density of the blood, gives a result in close agreement with that of body; division of the similar figures in the body value by the same factor, the specific gravity of the blood. The average difference between the two classes was 0.00577, varying from 0.0045 to 0.0065.

The moral of the matter logically follows: corporeal density may be readily and simply determined with reasonable accuracy from that of the blood, without the necessity for employing laborious and technical methods.

Information is furnished by knowledge of the body density of an individual on—(1) *Body soundness*.—Below 1.063 or above 1.073 in adult males indicates unsoundness (Stern speaks here of “healthy” males showing these signs of ill-health). (2) *Body immunity*.—Low values—susceptibility to infections; high values—eliminative disorders. (3) *Body power of work*.—Values above or below average normal limits denote lack of strength and endurance. (4) *Duration of life*.—Abnormal values lessen expectation. In phthisis the blood density is usually low, so presumably the corporeal specific gravity is also diminished.

THE BODY TEMPERATURE OF THE GOORKHA.

THAT these excellent little fighters from the highlands of Nepaul have colder blood in their vessels than the generality of mankind, has before now been recorded; that this abnormality arises from some variation in metabolism is devoid of doubt; what that variation consists in, Lalor (*Indian Med. Gaz.*, Calcutta, February 1901) has set himself to solve, especially in connection with the supposition entertained by himself and others, that Goorkha sepoys are particularly subject to pulmonary tubercle. Obtaining six healthy examples of the type, he found their average temperature to be 97°·1 F. in the axilla, during a period of eleven days, under ordinary conditions, except that they were ordered to abstain from consumption of sugar as far as possible. For other eleven days, when, in addition to their ordinary diet, they consumed 6 oz. per diem of “country sweets,” their temperature, taken morning and evening, averaged 97°·4 F. Deprived of their saccharine accessory, the thermometer gave a mean of 97°·2 F. for a third period of equal duration. In each case, without exception, the thermometer rose with the administration of the sweets, and fell after they were inhibited. Ergo, the healthy Goorkha is so abnormally constituted, that his body temperature is low; probably from some aberrant muscular metabolism, because sugar, an important muscle food, diminished the variation from normal. Proceeding, Lalor takes up the subject of excessive prevalence of phthisis among Goorkhas, as suggested by him, and argues that as the wasting of muscular and fatty tissues is a prominent feature of that disease, while sugar increases the heat-giving metabolic processes in the muscles of subnormal Goorkhas, sugar ought to correct the tendency of the latter to develop tubercle, and possibly may be beneficial in the treatment of all phthysical cases for the repair of muscular waste.

[As the author omits from his table of cases of phthisis all reference

to the total number of men among whom they occurred; as a daily consumption of 6 oz. of "country sweets" might well induce a rise of temperature, owing to over-indulgence in such articles, and local irritations; and as in phthisis the temperature is raised because of increased metabolic changes, and sugar given in bulk seems also to raise it, its employment would only be adding fuel to the flames. A point possibly of greater importance lies in the assumption, upon theoretical lines, that the Goorkha owes his subnormal temperature to an excess of carbohydrates in his diet, too many sweets and too little fat.—A. L. G.]

A CLINICAL FERROMETER.

JOLLES (*München. med. Wchnschr.*, February 26, 1901) adds details to his article in the *Berl. klin. Wchnschr.*, 1899, No. 4, upon the merits of estimating the proportion of iron in the blood by means of a clinical ferrometer. Thus, 50 c.mm. of blood are drawn, *secundum artem*, without pressure or massage, from a finger-tip or ear-lobe, into a graduated pipette, expelled into a platinum capsule, the pipette washed out with distilled water, until this no longer becomes tinted red, and the washings added to the capsule. The contents dried on a water-bath are carefully incinerated; acid potassium sulphate (0·2 gm.) added, again placed over a flame, until no further evolution of sulphuric anhydride occurs. The residue is discoloured in 3 c.c. of water, being heated until the solution is clear, when it is poured off into a glass vessel; the process of raising the contents of the capsule, still undissolved, to a red heat, after addition of more bisulphate of potassium, is repeated, it may be twice or thrice. To the washings, 3 c.c. dilute (1:3) hydrochloric acid is added, shaken, and left to cool; 3 c.c. of ammonium rhodanate solution, 30 per cent., is then added, and water to a mark on the glass cylinder. The proportion of iron present is then ascertained from the degree of colour, and the obscuration of graduated marks produced by this in a special apparatus. Normally the percentage of iron varies from 0·0413 to 0·0559 by weight, or a little more. From his own work and that of others he is of opinion that accurate deductions from the results obtained with the hæmoglobinometer, or the ferrometer, singly are impossible; only by their combined use can correct conclusions be arrived at. In jaundice, for instance, as the disease varies in degree, so does the hæmoglobin value, although the iron factor remains practically unaltered. In blood diseases, such as purpura, the iron is frequently lowered, the hæmoglobin raised for some time after attacks. Several observers, notably Kornfeld and Fölkel, have recently shown that they had been able to control pathological states of the blood with greater success and certainty, when aided by a knowledge of the amount of iron present, than of the hæmoglobin content alone.

MOUNTAIN SICKNESS (LE MAL DES ALTITUDES).

GUGLIEL-MINETTI (*Progrès méd.*, Paris, January 26 and February 2, 1901) spent thirteen days on the summit of Mont Blanc, and has prepared a most interesting though discursive article therefrom. He particularly compares the discomfort and distress frequently experienced

by those ascending to high altitudes with "le mal de ballon," the analogous symptoms which balloonists have on occasion suffered from, notably in the persons of Crocé-Spinelli, Sivel and Tissandier, Glaisher and Coxwell, in the course of the two celebrated though disastrous ascents entered into by them.

The paper is much more profusely illustrated than is usual in professional journals, a number of good and a few bad photographs of Mont Blanc, of Alpine work, of M. Vallot's observatory, and highly idealistic representations of the troubles which attended the before-mentioned aeronauts when they had attained to great heights.

The writer having been accorded permission by M. Vallot to make use of his hut, 4400 metres above sea level (14,441 ft.) and 400 metres below the summit of Mont Blanc, ascended first to the Grands-Mulets, 3000 metres (9846 ft.), where he passed the night; noting that the aged cook, who had spent twenty summers in the chalet there, had been deprived of having either a dog or a cat as a companion in her frequent isolation, as these animals promptly became ill when conducted to that altitude, her only helpmeet was a hen, which appeared to be able to resist the effects of 3000 metres. Next morning at three, he started for the top, only 1800 metres (5907 ft. above his last lodging-place), and occupied ten hours in attaining the afore-mentioned hut, 400 metres from the actual summit. His pulse was 110 per minute; his respiration 37, deep, rapid, approaching to the Cheyne-Stokes type; while, despite their rapidity, he suffered from frontal headache. The slightest effort intensified the pain, and caused palpitation. Were these symptoms due to fatigue or cold? So he opined at first. Next morning, however, after a night during which he cannot say whether he slept at all or not, attempting to lace up his boots raised his pulse from 110 to 160 per minute.

During the next three days the pulse rates of the party fell to from 80 to 85, but on slight exertion rose again to 110 or thereabout. The number of red corpuscles in his blood, and in the blood of his two companions, fell markedly, as did the proportion of hæmoglobin. They individually lost about 300 to 500 grms. (0.6 to 1.5 lb.) in weight each day. It was not until the fifth day that the party acquired sufficient energy for the further ascent of 400 metres between the hut and the summit. After the fifth day they apparently had become acclimatised to their surroundings. Two days after descent, one of his companions reascended along with a young physician in Chamounix. The latter contracted double lobar pneumonia and died in two days; the former, ten days after his final descent, was attacked with paralysis of his limbs and even his tongue. Several months elapsed before he was able to move about.

Regarding the many theories adumbrated to explain *mal de montagne*, the more scientific amongst them are based upon the physico-chemical influence produced by lowered atmospheric pressure. Cold, digestive derangements, and fatigue are only to be looked upon as accessory. The idea that the diminished atmospheric pressure induces liberation of gases combined with the blood, is insupportable, as also that suggesting the cause to be excessive dilatation of the bowel, from expansion of its gaseous contents. Mosso lately suggested that excessive exit of carbonic acid from the blood, leading to deficient amount of that compound in the body, was the cause.

The author's experience near the summit of Mont Blanc led him to ascribe more influence to the mechanical hindrance to circulation, at high altitudes, in the causation of mountain sickness, than to the most feasible of hitherto suggested origins, that of diminished oxygen. In fact, he took up with him a supply of compressed oxygen, but found it of no service in combating the distressing symptoms endured. The main source of circulatory disturbance is to be found in distension of the peripheral vein, and stagnation in the portal system.

Further interesting details, in particular those concerning the troubles of aeronauts who have attained a height of over 8000 metres (26,256 ft.) must be left for consultation in the original.

SURGERY.

UNDER THE CHARGE OF
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ON THE SENSIBILITY OF THE PERITONEAL CAVITY.

PROFESSOR LENNANDER of Upsala contributes an interesting paper on this subject, and draws attention to several points concerning the sensory functions of the abdominal organs. His observations were chiefly made in the course of operations when no general anæsthetic was employed, the patient being able to describe his sensations during the manipulations of the surgeon.

The parietal peritoneum is sensitive to touch and pain in the greater part of its extent, and especially that lining the anterior abdominal wall and the iliac fossæ; the patient at once complains of pain when it is put on the stretch, rubbed with gauze, or roughly handled in any way. The visceral peritoneum, on the other hand, is for the most part insensitive, and may be stretched, rubbed, incised, and sutured, without the patient being aware of it; it is similarly insensitive to the actual cautery, to heat and cold (as tested by the application of ice or of hot and cold metal instruments), and to the application of such irritants as nitrate of silver. There would appear to be an absence of nerves conveying tactile, thermal, and painful impulses in the greater part of the small intestine and its mesentery, in the great omentum, greater part of the stomach (in the vicinity of the greater curvature), in the cæcum and appendix, and in the transverse and sigmoid colon. Operations may be performed on these viscera, such as anastomoses and resections, without an anæsthetic, and the patient may be unaware of what is being done; adhesions between these organs may be separated without pain. The patient is not aware of the protrusion of the intestines from a wound, of their exposure to the air, or of the occurrence of exaggerated peristalsis, provided there are no adhesions to the parietal peritoneum liable to cause stretching of this membrane. There is a similar absence of sensation in the convex border and superficial cortex of the kidney, in

the gall bladder, in the liver, and in the peritoneum covering the urinary bladder.

As already stated, the parietal peritoneum is most sensitive to tension or stretching, as when sponges are pushed in or withdrawn from the belly cavity, when the edges of the abdominal wound are drawn apart by retractors, when any one of the abdominal viscera connected with the parietal peritoneum is pulled upon, as may happen in handling the cæcum, ascending colon, hepatic or splenic flexure. Traction on adhesions connected with the parietal peritoneum is interpreted by the patient as pain.

The sensitiveness to pain of the parietal peritoneum depends on the stretching or compression of nerve fibres running in the subserous coat, derived from the intercostal, lumbar, and sacral nerves. The author observed that if these nerves are divided or injected with cocaine, when making a lateral incision into the belly, the peritoneum internal to the site of division is rendered insensitive. The serous membrane on either aspect of the diaphragm would appear to be sensitive; the patient complains of pain when pads of gauze are pushed in between the diaphragm and the anterior surface of the liver.

It has been maintained by several observers that while the peritoneum is quite insensitive when it is healthy, it becomes very sensitive when it is inflamed. The author is convinced, however, that the visceral serosa is insensitive in acute peritonitis, and that the presence of pain and tenderness of the belly wall depends on whether the parietal peritoneum is involved or not. In appendicitis, for example, pain is not a prominent symptom, unless the infection and inflammation involve the parietal peritoneum. That acute septic peritonitis may run its course without pain or tenderness, is well recognised, and may prove very misleading in practice.

There is abundant clinical evidence of the insensitiveness of the various abdominal viscera already mentioned. We are not only unaware of the passage of the normal contents through the alimentary canal, biliary passages, and ureters, but gastric and intestinal ulcers may run their course without pain, gall stones may lie in the gall bladder and give rise to no symptoms; exaggerated intestinal peristalsis is not perceived by the patient unless by the gurgling noises which may accompany it.

The author explains the source of intestinal colic as follows: Whenever portions of the bowel, such as the cæcum, ascending and descending colon, or the hepatic or splenic flexure which are attached to the parietal peritoneum, are distended beyond a certain point, the parietal peritoneum is dragged upon, its nerves are stretched, and pain results. When the distension of the bowel subsides, as a result of the passage of flatus, the pain is relieved and soon disappears. The stretching of the parietal peritoneum in extreme cases of ascites is too gradual to give rise to painful impulses.

Diseases of the stomach and intestines, such as simple ulcer, typhoid, dysentery, or cancer, are usually unattended by pain, until they involve the parietal peritoneum, either by perforation or by infection spreading along the lymphatics. Adhesions between the viscera do not cause pain, while those involving the parietal peritoneum cause suffering by

dragging on its nerves; familiar examples are those attaching the bowel to the anterior belly wall, such as may be associated with ulcers, with cancer, or with appendicitis.

The second half of the paper is concerned with the employment of local and general anæsthesia in operations for hernia. The author advocates a more extended use of local anæsthesia; when a general anæsthetic is required, its administration should be stopped at the stage when the bowel is to be manipulated.—*Centralbl. f. Chir.*, Leipzig, February 23, 1901.

ANALGESIA OBTAINED BY SUBARACHNOID SPINAL COCAINISATION.

TUFFIER of Paris has reported to the Academy of Medicine the conclusions derived from his experience in 300 operations. The injection of a solution of hydrochlorate of cocaine into the subarachnoid space in the lumbar region produces complete analgesia below the level of the diaphragm. The analgesia is of sufficient duration to allow of any operative interference, and is not accompanied by any grave symptoms. The age of the patients ranged from 10 to 79 years. The patient may be placed in any position which will favour the performance of the operation. Men are better subjects for cocainisation than women. The method is not suited for children, because they are apt to be frightened, or for hysterical individuals, who may complain of pain without cause. Patients with heart affections or with arterio-sclerosis stand the cocainisation very well.

The analgesia is perfect for operations on the lower extremity, hip, perineum, anus, rectum, vagina, uterus, testicle, prostate, bladder, ureter, and kidney. It is also preferable to a general anæsthetic in operations on the lower two-thirds of the thorax. Tuffier does not recommend the method in intraperitoneal operations, unless the operator is accustomed to abdominal surgery, because of the inconvenience which may arise from nausea and vomiting, especially in operations on the stomach and intestine.—*Gaz. d. hôp.*, Paris, February 5, 1901.

Fowler of New York records his experience in eighty-one cases, twenty-six involving the peritoneal cavity, thirty-four in the pelvic region not involving the peritoneum, and eighteen in the lower extremities. In a case of inflamed and incarcerated ventral hernia, the patient complained so persistently that it was necessary to administer a general anæsthetic. In a case of ruptured ectopic gestation the patient became frightened on account of the hæmorrhage, and it became necessary to give chloroform in order to quiet her. Patients did not complain of a moderate Trendelenburg posture, but expressed discomfort when the pelvis was extremely elevated for some time. In three cases of inguinal hernia the patients complained of pain when the distribution of the ilio-inguinal and ilio-hypogastric nerves was invaded. There was also complaint of pain on manipulation of the parts in a case of acute appendicitis. In two cases of varicocele the patients complained of slight pain when the cord was handled. In repairing the perineum, a patient complained of the return of sensation before the operation was completed, and it became necessary to administer a general anæsthetic. The amputations included one at the hip-joint and

one in the middle third of the thigh. In a case of supra-malleolar osteotomy, the patient could tell which bone was being divided, but at no time complained of pain. In a case of resection of the ribs, for gangrene of the lung and empyema, the superficial parts were analgesic, but the patient complained greatly when the periosteum and intercostal nerve were peeled off the bone. In a case of nephrectomy the patient refused to believe, at the conclusion of the operation, that her kidney had been removed. In a case of incision of the abdominal wall for suppurating dermoid cyst situated in the umbilical region, the line of demarcation of the anaesthesia was found to run across slightly below the point where it was necessary to incise and curette; it was interesting to note that this line persisted at the same level through the whole depth of the wound.

As regards the technique of the lumbar puncture, Fowler finds that the space between the third and fourth spinous processes is usually the most available, but the space above or below may be used, if more easily identified. The solution should be freshly made with sterilised water, and boiled for one minute before using. For a short operation a quarter of a grain of cocaine dissolved in 10 minims of water is used; for a longer, half a grain. The patient is most comfortable when lying in the Sims position. Analgesia is present in the soles of the feet in from one to five minutes, and extends to the umbilicus in from five to fifteen minutes. In two cases the analgesia reached to the vertex. In no case did the analgesia subside below the umbilicus under twenty-seven minutes (one case); in all the rest it lasted more than forty minutes, save in one in which it subsided in thirty-one minutes. For further details the reader is referred to the original paper in the *Med. News*, N. Y., January 5, 1901.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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APPENDICITIS IN THE FEMALE.

F. W. M'RAE (*Am. Journ. Obst.*, N.Y., Jan. 1901) refers to the statistics of several eminent authorities showing the relative frequency of appendicitis in the male and in the female.

Einhorn found in 18,000 successive autopsies, perforating appendicitis in 55 per cent. of males and 57 per cent. of females. Robinson, in 128 autopsies, found evidences of past peritonitis in or about the appendix in 68 per cent. of females and 56 per cent. of males. Clinically, Edebohls finds that 4 per cent. of all women have appendicitis, while Deaver believes that 80 per cent. of all cases occur in males.

Of 1557 cases of appendicitis collected from the annual reports of the city hospitals of Berlin, 949 were males and 628 females. These statistics serve to show the divergence of opinion which exists as to the

relative frequency of appendicitis in the two sexes. In nearly all the cases which had come under his own notice in the female, mistakes in diagnosis had been made either by himself or by the attending physician. Almost all the attacks had occurred at or about the menstrual period, and most of them had been mistaken for inflammation of the tube or ovary. In two of his own cases, the appendix along with the right tube and ovary was involved. In other two cases, the appendicitis was associated with diseased kidneys, whilst other two suffered from recurrent appendicitis with attacks of renal colic before or after operation for removal of their appendices. He had records of forty-nine cases of appendicitis seen within the last sixteen months—twenty-nine males and twenty females, and had operated on seventeen males and fourteen females. The author proceeds to give details of some of his cases.

Dr. Hal. C. Wyman cited a case of extra-uterine pregnancy complicated with appendicitis. He removed a foetus, which had apparently died at the end of the seventh month of pregnancy, thirteen months after the appearance of the first symptoms of pregnancy. The appendix was found intimately blended with the fimbriæ of the right tube. The right Fallopian tube was involved by dense inflammatory adhesions with the appendix, and it occurred to him that, in consequence of that blending, the impregnated ovum had escaped, and that some cases of extra-uterine pregnancy might be due to adhesions between the fimbriæ and the appendix. In his case the appendix was $3\frac{1}{2}$ in. long, had a number of scars, was much hardened at its end and at the point where union with the fimbria occurred.

Dr. Howard A. Kelly said that for four years he had made it a rule at the Johns Hopkins Hospital to have stated, on a slip, the exact condition of the appendix. During this period he had removed 150 appendices, of which number sixty were involved in pelvic inflammatory disease. In twelve cases the appendix was adherent to myomata, in nine to ovarian tumours. He found carcinoma of the appendix secondary to ovarian carcinoma, without any traceable macroscopic relation in one case, and primary carcinoma in one other case. Tuberculosis of the appendix, secondary to tuberculosis in the tubes and ovaries, was present in three cases, the remaining cases included calculi, cystic disease, and uncomplicated appendicitis. In opening the abdomen for any pathological condition, he would examine the appendix, provided the incision was sufficiently large.

HISTOGENESIS OF OVARIAN DERMoids.

W. D. HAGGARD, jun. (*Am. Journ. Obst.*, N.Y., Jan. 1901) states that dermoid cystomata of the ovary differ from dermoids in the orbit, pharynx, mediastinum, scrotum, coccyx, and elsewhere. The latter result from inclusions of the ectoderm in the development of the embryo, similar to the "healing in" of skin in wounds, and the subsequent development of a dermoid growth. These structures all contain sebaceous material—hair, plates of bone, teeth, etc., and purely dermal derivatives. Ovarian dermoids contain derivatives of all the mesoderm and enteroderm as well, and hence some adequate explanation, other than the inclusion of the skin-forming layer, must be forthcoming.

All kinds of curious theories have been successfully advanced. The virginal pregnancy idea was succeeded by one which ascribed the origin of these growths to prolonged ungratified sexual desire on the part of the woman. A man who jested at his wife during labour was afflicted with a pregnancy (dermoid) of the thigh. Dermoids of the ovary are, however, akin to teratomata, and it is to the ovum itself that we must look for a solution of their etiology. Some pathological activity on the part of the ovum in the Graafian follicle is responsible. Bland Sutton found a dermoid of the ovary in a horse, where the growth was undoubtedly in the ovum, suspended in a large Graafian follicle. Similar cases have been reported in women.

Kræmer, in his recent investigations, has gone far to prove that ovarian dermoids contain products of all the blastodermic tissues; that they cannot spring from an evolutionary inclusion simply, as dermoids elsewhere undoubtedly do; that they are of ovulogenous origin—a sort of parthogenesis.

In evidence, an attempt at formation of nearly all the organs of the body has been found in the lawless development of these benign growths—retinal pigment, more or less complete; optical vesicles; a rudimentary pharynx, with an attempt at the formation of an œsophageal tube; the sympathetic nerves in the alimentary canal; and, curiously enough, a rudimentary uterus, with branching cells of the cervix, and the glands of the fundus; mammæ, one case of which underwent carcinomatous development; an easily recognised heart, provided with valves, was found by Johnston; and many other more or less perfectly formed organs and tissues, other than dermal, have been reported by numerous observers. These data have, according to Clark, dealt a fatal blow to the inclusion theory of ovarian dermoid evolution. The researches of Kræmer and others seem to establish convincingly the ovulogenous theory of their development.

THE FATE OF SPONGES, LIGATURES, AND OTHER FOREIGN BODIES IN THE PERITONEUM.

CARL BECK (*Chicago Med. Rec.*, Nov. 1900) states that foreign bodies left in the abdominal cavity may be absorbed, encysted, or may enter the intestine or uterine cavity. Sponges are left by accident in the abdomen, but silk and other unabsorbable ligatures are used designedly and may also cause serious trouble. Some surgeons think that the ligature remains encysted for a long time, others that in course of time it is absorbed; but experiments upon animals go to prove that, if it does not become encysted, it passes out of the body after suppuration, and enters into the intestines, uterus, or bladder. A child operated upon for hernia and ligation of the sac with sterilised silk, suffered six months later from bladder symptoms. On examination, a stone was found, and when removed proved to be an encrusted silk ligature. In another case, the patient suffered from a tender tumour the size of a child's head, giving rise to great pain, particularly when the bowels moved. This was diagnosed as a case of inoperable cancer, but was afterwards demonstrated to be a large convolution of infiltrated omentum, in the centre of which was a loop of small intestine perforated on its convex side, while on the

omental side a ligature of thick silk protruded into the bowel from a granulating cavity. Six months previously the patient had been operated upon for hernia, when the omentum was ligatured with strong silk and the stump pushed into the abdomen. In a third case the patient was operated upon for double pyosalpinx, silk ligatures being used. She subsequently developed profuse leucorrhœa, and on curettage a silk ligature was removed from the uterus, and the condition cured. Several months later, a fæcal fistula formed, due to another ligature perforating the bowel.

The process of sloughing may go on without any significant disturbance, or hæmorrhage may occur from the bowel, bladder, or uterus. Where the foreign body passes into the bowel there may be tenesmus and foul rectal discharges, or stercoral fistula with an abscess. When it passes into the bladder or pelvis of the kidney, a stone may be formed, giving rise to the usual symptoms. In the intestine, a small scar, if the process is completed, may be without significance, but if two portions of bowel are connected which are far apart, for example duodenum and colon, the fæcal fistula may be very serious, as all the food passes the short road.

Absorbable sutures should be used as far as possible. When non-absorbable sutures are used, the thread should be as small in size and quantity as possible, and interrupted used in preference to continuous sutures. If sloughing of a buried suture be suspected, a way should be opened up for its escape, and so prevent it taking a dangerous route.

SMALLPOX IN FÆTUS ABORTED AT THE FIFTH MONTH.

C. W. RUMMEL (*Phila. Med. Journ.*, Nov. 10, 1900) reports the case of a young married woman, pregnant for the first time, who on the 30th June was taken with chills, headache, lumbar pains, and fever. No physician was called, but her father had just recovered from smallpox. Her condition improved when the eruption appeared, and she was soon up and about. On July 21 she began to have pains, which gradually increased in severity, and the child was born on July 25. The foetus, which was of five months' development, was covered with an eruption, most marked on the face and chest. There were confluent lesions on the face, and many of the vesicles showed traces of umbilication. The day before the woman's pains began, the health officer had fumigated the house with formaldehyde, to which fact the friends attributed the miscarriage.

APPENDICITIS AND PREGNANCY.

A. PINARD (*Ann. de gynéc.*, Paris, May 1900) reports two cases of mistaken diagnosis by others, with fatal results. In one the first symptoms were supposed to be due to indigestion, and when they became more severe, and labour pains set in, they were supposed to be due to a slow labour, and eventually to general peritonitis from rupture of the uterus. In the second case indigestion was again diagnosed, and the pain quieted by opiates. Operation was too late in the first case, and in the second the woman was dying when Pinard first saw her. In contrast the author

records several cases correctly diagnosed and successfully operated upon. Early diagnosis is possible, as the signs of pregnancy do not mask those of appendicitis. He has never observed the absence of pain and muscular rigidity. All pain in the abdomen during pregnancy should attract attention, especially when constantly localised in the right iliac fossa. If abortion or premature labour can be excluded, appendicitis should always be suspected. Vomiting of pregnancy is not accompanied or followed by rise of temperature, hence vomiting with fever should suggest appendicitis rather than indigestion. Pinard adds that all cases of peritonitis and intestinal obstruction complicating pregnancy, which he has seen treated medically, have died. The diagnosis of appendicitis during pregnancy having been made, operation at the earliest possible moment alone offers chances of recovery.

THERAPEUTICS.

UNDER THE CHARGE OF

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ACTION OF IRON.

In the *Ztschr. f. Biol.*, München, Abderhalden published three articles dealing with the absorption and assimilation of iron, and its relationship to the formation of blood. To obviate the possible fallacy of a corroding action on the mucous membrane, he employed only very minute doses of ferric chloride and hæmatin and hæmoglobin. The drugs were administered with the food, and the dose was apportioned so that weight for weight it bore a similar relationship to the therapeutic dose used in treating human beings. The first series of experiments confirmed the former observations regarding absorption. By means of sections stained with ammonium sulphide, it was shown that the absorption took place in the duodenum. It is then taken by the lymphatics to the mesenteric glands, and is chiefly deposited in the liver, spleen, and bone marrow. It could also be demonstrated in the muscles and occasionally in the kidneys. This series of experiments showed that iron contained in normal food, or in hæmoglobin or hæmatin, or in the form of ferric chloride, was all absorbed in the same way, and has a similar mode of leaving the body. The course of all these different forms of iron could be traced by means of the same stain, namely, ammonium sulphide and ammonia. The fact that after absorption the iron in the organic combinations is demonstrable by these reagents, shows that some change takes place during absorption, which may possibly be due to the action of the epithelial cells.

In the second series of experiments the dead animals were skinned and the intestines removed. The hæmoglobin of the rest of the body was then determined by mincing the tissues and extracting them with water. The extract was then compared with a standard hæmoglobin solution, and in this manner the absolute amount of hæmoglobin in the

body was easily determined. The results obtained were as follows :—The iron contained in the normal diet is sufficient to produce the normal amount of hæmoglobin. Animals fed on a diet poor in iron, but receiving additional iron in the form of inorganic iron, are not able to form as much hæmoglobin as animals on a normal diet. The addition of inorganic iron to a diet poor in iron caused increased growth, while hæmatin and hæmoglobin added to diet poor in iron had no stimulating effect on growth. The addition of inorganic to a normal diet stimulated growth, while hæmatin and hæmoglobin had no such action. Iron in form of hæmatin and hæmoglobin, or inorganic iron added to diet poor in iron, stimulated formation of hæmoglobin. Inorganic iron added to normal diet increased the hæmoglobin, while the organic compounds had not this effect. In every case the animals on a normal diet were able to assimilate more iron than when iron, organic or inorganic, was added to a diet poor in iron. There is then a distinct difference in the action of organic and inorganic iron, organic iron having a much greater stimulating effect on the hæmoglobin formation when added to diet poor in iron. The stimulating action of inorganic iron was greater the more iron the food contained. Abderhalden thinks that the inorganic iron is not used in the formation of hæmoglobin, but goes to supply the tissue iron, thus allowing the iron contained in the food to be utilised for hæmoglobin formation. Probably inorganic iron circulating in the blood has a stimulating action on the cells forming hæmoglobin. This stimulating action is probably the explanation of its usefulness in chlorosis.—*Ztschr. f. Biol.*, München, 1900, Bd. xxxix.

SALINE INJECTIONS IN PNEUMONIA.

HENRY recommends the injection of saline fluid in cases of severe pneumonia in alcoholic subjects. He uses a solution containing about 50 grs. of chloride of sodium to the pint of water. The object of the treatment is to make up for the apparent deficiency of fluid in the body, as shown by the dry tongue, etc. By diluting the blood he hopes to prevent ante-mortem coagulation. In a severe case in a woman, æt. 63, five injections of a pint each were administered during five days. The patient was so stuporose that the first prick of the needle was not felt. The result of the injection was to modify the course of the disease. There was no crisis, but termination by lysis, convalescence commencing on the seventh day. Henry notes that, as a rule, where hypodermolysis is employed, defervescence is by lysis. In only one out of ten cases did the disease terminate by crisis. Out of twelve cases, two died, the other ten recovered. Of the ten successful cases, one was a man of 77, with a pronounced valvular lesion, two were cases of double pneumonia, and another was an infirm woman of 63. All the patients were more or less addicted to alcohol. Though all the cases received the ordinary treatment of ice-bags and stimulants, Henry is convinced that the most efficacious of the measures employed was the hypodermolysis.—*Internat. Clinics*, London, Ser. 9, vol. iv.

CLINICAL STUDY OF DIPHTHERIA.

BURROWS (*Am. Journ. Med. Sc.*, Phila., February 1901) records his experience with 2093 cases of diphtheria. Excluding 131 cases of mixed infection and sixty-nine moribund cases which died within twenty-four hours of admission, there remained 1893 uncomplicated cases with a death-rate of only 9 per cent. If the moribund cases are included, the death-rate is 12·3 per cent. Before the introduction of antitoxine, the Boston death-rate was 30 per cent. Burrows finds that there is a decreasing death-rate from infancy to adult life. He notes that the first culture taken is often negative, and the subsequent ones positive. In 65 per cent. of the cases there was cardiac disturbance, the most frequent lesion being a soft systolic murmur over the mitral valve and cardiac irregularity. A rapid pulse, continued after the initial period of an attack of diphtheria, means a guarded prognosis, as to time of recovery at least, and requires continued rest in bed. The free use of antitoxine has greatly diminished the frequency of albuminuria. Out of 1757 cases examined, 1256 had no albumin, and in no case was more than $\frac{1}{4}$ of 1 per cent. found. The hot-pack was of much benefit in cases where the urine is greatly diminished, but required to be carefully watched on account of the weakened condition of the heart. Laryngeal stenosis occurred in 337 cases. Of these, 213 were intubated; the other 124 reacted so promptly to the antitoxine that intubation was unnecessary. Of the intubated cases ninety-six died, thirty-seven of them within twenty-four hours of admission. As regards treatment, Burrows considers that in antitoxine we have a remedy which possesses the power of perfectly neutralising the toxine, and the recovery of the patient depends entirely on whether or not the remedy is administered early enough and in sufficient quantity. As regards the amount necessary, the membrane alone is an imperfect guide. It is often necessary to continue the antitoxine after the membrane has gone, if the toxæmia persists. Burrows gives 4000-unit doses, repeated every four hours, as long as necessary. In some cases he repeats the dose every two hours, and occasionally 8000 units were used every four hours. The beneficial effects of the antitoxine treatment is seen in a series of 100 cases of diphtheria which occurred among the staff, in which there was no death. In many cases the membrane could be seen to extend and thicken, even after three or four 4000-unit doses, and then rapidly disappear when the dose was doubled. The urticarial and erythematous rashes are never dangerous, and usually of short duration. Intubated patients are fed with the œsophageal tube, in a partially sitting position, which lessens the risk of inhalation pneumonia. When vomiting has been very troublesome, rectal alimentation may be employed. The rectum in children is very tolerant.

THE TREATMENT OF PNEUMONIA.

FOR lack of a specific remedy, we are reduced to symptomatic treatment of the symptoms and complications directly threatening life. The fatal result may be due to many causes. In a certain percentage of cases death is due to suffocation, the infiltration involving so much of the

lung tissue that the remaining portions are unable to adequately supply oxygen. The more common way, however, is that œdema takes place in the previously free portions of the lung. Another common cause of death is cardiac failure. In a very few cases the right heart may be unable to overcome the increased resistance in the pulmonary circulation. A common cause of death is the presence of a complication. The most important are—(a) chronic alcoholism, with its attendant danger of delirium tremens; (b) a pre-existing, or at least threatening, insufficiency of the heart, owing to myocarditis, badly compensated valvular lesions, arterio-sclerosis, obesity, chronic nephritis, emphysema, and scoliosis; (c) old age. All these as causes of death are less important factors than the danger, which in a severe infection is always present, of the development of a pneumococcic sepsis, which leads to paralysis of the vasomotor centre. The importance of this factor is, that it is the common cause of death in healthy young individuals, who would otherwise have the best chance of surviving. The enumeration of these varied dangers to life shows that in the treatment of pneumonia we must individualise. At present we have no means of checking the spread of the disease, which takes place along the interalveolar and interlobular lymph spaces, and this probably explains the limitation of the disease to a single lobe. When another lobe becomes affected, it is often due to inhalation or aspiration of infectious matter. The indication, therefore, is to obviate as far as possible the retention of infectious material in the bronchi, by providing free expectoration and easy breathing. To remove the pain in respiration, use local applications, as moist compresses, sinapisms, and ice-bags. In very severe cases we may give small doses of morphine, which have no depressing action on the respiratory centre, and rather act as expectorants. Should it be not so much pain that is hindering the breathing and expectoration, as the severe infection, leading to numbing of the centres and a typhoid state, cold or lukewarm baths are indicated. The indication for a bath is not high temperature, but the necessity of a stimulant to the sensorium and respiration. To relieve the right heart, a free venesection is the best remedy. The treatment in pneumonias in which the danger to life depends on complications, should be directed against the complication. Thus alcoholics require alcohol and stimulants. To allay excitement, use bromide and opium. Chloral had better not be used. Where the patient has cardiac disease, the greatest care is necessary. Whenever the slightest sign of muscular insufficiency occurs, digitalis should be given. For an immediate effect digitalin may be given subcutaneously. In cardiac cases it is necessary to attend to the diet. To ensure the proper amount of nourishment in small bulk, the artificial albumin compounds may be used—as plasmon, tropon, etc. Carbohydrates are best administered in the form of thick meal soup, with which fat in form of butter may be mixed. In old people and in obese subjects, frequent cold bathing is contra-indicated. When the danger to life depends on the severity of the pneumonia alone, our treatment remains symptomatic. The attempts to treat with antipneumococcic serum has proved so far ineffectual; so also for the administration of remedies like pilocarpine, with the object of increasing the number of leucocytes in the blood, on the ground that the leucocytosis was a protective measure on the part

of the organism. Pässler holds that whenever the pneumococcus gets into the blood the number of leucocytes falls, and that this explains why absence of leucocytosis is of grave significance. As the circulatory collapse usually depends on the direct action of the pneumococcus on the vasomotor centres, and not on the action of the toxins on the heart, digitalis is not satisfactory, as its action is very transitory. Camphor and caffeine are much better. The effect of camphor is slow, but caffeine in the form of sodio-salicylate can be given hypodermically in 3-gr. doses, four to six times daily, and causes an immediate and lasting stimulation of the circulation. Strychnine only stimulates the circulation when it is given in such doses as cause spasms. Ether is not to be used as a stimulant, as it has a depressant action on the circulation. As regards saline infusions, which were wrongly introduced to remove the toxins by causing diuresis, they may sometimes prove useful by raising the blood pressure, though they can have no action on the bacteria in the blood which are the real cause of danger. Though he had no new remedy to propose, Pässler thinks that we have made no mean advance by the modern investigations, which give us more precise indications for the use of old drugs.—Pässler, *München. med. Wchnschr.*, 1901, Nos. 8 and 9.

INSANITY.

UNDER THE CHARGE OF

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THE CENTRES OF PROJECTION AND ASSOCIATION OF THE HUMAN BRAIN—
A DISCUSSION IN THE SECTION OF NEUROLOGY OF THE INTERNATIONAL
CONGRESS IN PARIS, 1900.

PROFESSOR FLECHSIG of Leipzig (*Arch. de neurol.*, Paris, October and November 1900) explained that his system of myelogenetic research was founded upon a study of the development of the nerve fibres in their course through the cerebral centres. It is a general law that fibres belonging to the same system or fasciculus take on the myelin sheath apparently about the same time, while dissimilar elements become covered with myelin at different epochs, which succeed each other in a fixed and recognised manner. Thus, after observing the successive formation of myelin sheaths on the various sensory tracts, on the corresponding motor tracts, and on the short and long systems of association, it is possible to map out on the cortex the various myelogenetic areas in accordance with the stages of their development. Similarly, in individuals of the same age, these cortical territories are of equal extent and similar disposition. There are in all forty such areas, but chronologically they may be divided into three groups—(a) primordial, of early develop-

ment, (b) terminal, of late development, and (c) those of intermediary development in point of time. There are from eighteen to twenty myelogenetic areas in the brain of the human foetus and newly-born infant, in which the well-developed fibres of the corona radiata can be demonstrated. The other territories destitute of coronal fibres are rich in long systems of association. It is thus possible, anatomically, to divide the cortical fields into projection and association centres. The presence of isolated projection fibres in the association centres, or of some association fibres in the projection centres, does not affect the validity of the classification. The four sensory projection centres have been previously described. They are the sphere of general bodily sensation, the visual sphere, the auditory sphere, and the olfactory and gustatory sphere. With the exception of the auditory, each of these spheres is formed by the grouping together of several myelogenetic areas. The sphere of bodily sensation includes eight such areas, each of the others three. There are four centres of association—the frontal, the parietal, the temporal, and the insula. More recently, the temporal and parietal have been grouped into one centre called the great posterior centre of association. It is particularly easy in these centres to discriminate between what may be termed central and peripheral zones. The central zones are peculiarly characteristic of the human brain, the peripheral zones are probably transition areas between the association and the sensory centres with which they come into contact, and with which they are united by means of numerous arcuate fibres. The island and pre-cuneus association areas consist entirely of peripheral zones. Occasionally, though rarely, atypical bundles of coronal radiating fibres, representing aberrant projection fibres from the sensory centres, are found in these peripheral zones, but such isolated discoveries by no means prove the general presence of coronal fibres in the association centres. The central territories of the association centres are the middle part of the angular gyrus, the third temporal convolution, and the anterior part of the second frontal convolution. The above-named areas are, to all appearance, the nodal points of the systems of long association fibres, and are the terminal centres. Their isolated destruction is not accompanied by any sensory or motor disturbance, and any motor symptom of an excitatory kind which may occur in association with lesion of any one of them must be interpreted as “action from a distance.” After their bilateral destruction, intelligence becomes enfeebled, and the association of ideas is particularly disturbed. They thus appear to be of the highest importance in the exercise of intellectual activity, in the formation of mental images, composed largely of sensory qualities, and in the accomplishment of such mental acts as the recognition of objects, reading, etc. Such functions are particularly disturbed with unfailing regularity in disease of the great posterior centre of association, a clinical fact which justifies our division of the cortex into sensory (projection) and association centres.

Professor Hitzig (of Halle) said—Flechsig's doctrine of the existence of centres of projection and association, exercising distinct functions in the cerebral cortex, is founded upon—(1) The alleged existence of fibres of projection in the one, and their absence in the other. That assertion is unfortunately not sustainable in its whole extent, for Flechsig has

himself abandoned it as regards one portion of his centres of association, and other authors have affirmed that they have found projection fibres passing into the centres of association. Yet it appears true that certain areas of the cerebral cortex possess much fewer fibres of projection than others which are in connection more or less direct with the terminations of sensory nerves. (2) Upon the chronological myelinisation of the centres of projection and of association, as well as upon that of the different centres of projection themselves. The statement cannot be admitted, at any rate wholly, because Flechsig himself has found individual differences in this respect, which he attributes, it is true, to pathological influences, but which other authors believe to be physiological. (3) Upon the anatomical differences between the various projection centres, and between the centres of projection and those of association. As the opinions of authorities are on this subject totally opposed, it is impossible to form a positive opinion.

In Flechsig's opinion, the function of the sensory centres consists in the perception of irritations proceeding from the various sensory organs, and in the association of these into intellectual images. He proves this part of his thesis by an analysis of such pathological conditions as tactile paralysis, sensory aphasia, etc. These views are, in general, conformable to my own.

The functions of the centres of association he states to be the conservation of memory images, as well as the reproduction and association of these; it may be by excitation from neighbouring sensory spheres, it may be by excitation of the centres themselves. He looks upon these centres, then, as the true organs of mind and of thought. Such opinions are purely hypothetical, and the deposition of images of memory deposited in nerve cells cannot be proved.

In spite of the above reservations, Flechsig's work must be regarded as a veritable epoch in our progress towards a better knowledge of the functions of the organ of thought. It would have been still more valuable if he had delivered himself of his opinions with more reserve and in a less dogmatic manner.

Professor von Monakow (of Zurich) began by referring to the fact that Flechsig had now entirely abandoned certain opinions which he had quite recently defended with some warmth. The anatomical question now resolved itself into this—Are the projection fibres really much less numerous in the association than in the sensory centres? The primordial territories also present, according to Flechsig, a particular cortical structure. The following are the results of my own researches:—The sum of the projection fibres united in the corona radiata and spread over the whole cerebral surface are only definitely found in connection with a relatively small number of cerebral points. In all the convolutions the projection fibres form but a fraction of the total mass of medullary fibres. Consequently there exist on the cerebral surface, considerable spaces, more or less extended in circumference, and encroaching the one on the other, where no projection fibres are to be found. One may call such cortical areas, destitute of projection fibres, "centres of association," in contradistinction to other cortical areas which possess these fibres, yet it is impossible with any precision to distinguish between dispersed areas, poor in projection fibres, and others which

contain them in abundance. Nor have I, more than other workers, been able to observe a fundamental anatomical difference between the two kinds of areas referred to.

The mode of distribution of the projection fibres in the cerebral cortex is unequal, and varies very much, being subject to individual variations. The method of research based upon myelinisation, brilliant though its results may appear at first sight, is far from sufficient to resolve the physiological problem of the fine organisation of the neurons of the brain. The amount of individual variation in the successive adaptation of the myelin sheath by the bundles of nerve fibres leads one to the conclusion that up till now the observations have been too few to warrant the enunciation of any fundamental law regarding the development of the conducting paths and of the centres. All that can be affirmed is, that it is reasonable to suppose that the development of the sensory centres precedes that of those parts of the cortex which subserve intellectual functions. The hypothesis which refers the higher psychical functions to specially limited cortical areas, possessing a particular anatomical structure, is unsustainable. The various elements which unite in the production of psychical force should rather be referred to the whole cortex. It must surely be that, in psychical exertion, sometimes one and sometimes other parts of the brain cortex must be involved. We think that Flechsig's theory, according to which the projection fibres of a cortical sensory path envelop themselves almost simultaneously with myelin, may be otherwise interpreted; namely, upon the architectural unity of the neuron complex. It may, for instance, be argued that myelinisation will occur in a neuron complex, at a certain period of embryonic development, in such a manner as that some elements of the group will precede others in the process of surrounding themselves with myelin. By a complexus of neurons, I mean the sum of those individual neurons which articulate with one another to form co-ordinated systems, embracing a number of neurons, which increase in number as they approach the cortex, and the minimum of which is the number necessary to produce a nervous act in the adult. In such a complex, composed of a large number of neurons of an analogous kind, the most central take on the myelin sheath first, while the peripheric neurons are later in this respect.

Dr. O. Vogt (of Berlin) gave the results of his own researches into the facts published by Flechsig:—(1) All nerve fibres of the same group (*valeur*) do not take on myelin at the same time. (2) Flechsig's law of progressive cellifugal myelinisation has not been confirmed by my researches. (3) Myelinisation of fibres takes place throughout the whole cortex at an earlier period than Flechsig alleges. (4) It is true that in man myelinisation commences in the primordial centres of Flechsig; but, contrary to his teaching, *without any visible arrest*, the myelinisation extends gradually from the periphery of the centres, until the process is completed throughout the whole cortex. It is therefore impossible, on account of the steady march of the process, to distinguish any definite number of regions, according to the stages at which they take on myelin. (5) One can still trace in the adult the effect of the non-contemporaneous myelinisation of different cortical regions, for the earlier an area takes on myelin the greater are its fibres and their

sheaths. (6) Without being able to prove the statement, for the process of myelinisation itself is incapable of affording such proof, I believe that for the most part the projection fibres are the first to take on myelin; yet there are association fibres which commence very early. The fibres of the corpus callosum remain a little behind, yet in an infant of one month, where a great part of the brain as yet contained no myelated fibres, commissural myelated fibres were found between regions of the brain which were among the first to become myelated. (7) In absolute contradiction to all that Flechsig has alleged, as long as there are regions in the cortex without myelin, there are equally portions of the internal capsule devoid of it; and these are just the portions which are in relation with those areas of the cortex which are equally late in taking on myelin. This we know from the results of the study of secondary degeneration. (8) Contrary to the opinion of Flechsig, we have established in carnivores and in rabbits that the process of myelinisation is on broad homologous lines identical with that in man. (9) Contrary to the teaching of Flechsig and Dollhun, all cortical regions in the carnivores possess projection fibres. (10) Still more, in opposition to Flechsig's teaching, side by side with these projection fibres, there are a still greater number of commissural and association fibres. (11) In animals as well as in man, the anatomical structure of the various cortical regions is different, yet, contrary to Flechsig's opinion, in animals no more than in man is the structure of the later myelinated centres the same.

DERMATOLOGY.

UNDER THE CHARGE OF

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THE ERYTHEMATA OF TUBERCULOSIS.

"To look upon erythemata to-day as morbid entities, as separate dermatoses," observes Paul Raymond (*Progrès méd.*, Paris, August 18, 1900), "appears to me to be a nosological error comparable to that with which the Vienna school has been so justly reproached, that of describing eruptive fevers among skin diseases." Erythemata, be they what they may, are but symptoms; they have purely a semeiological value, for they are only the signature on the skin of a general infectious or toxic condition, the infection itself being a form of toxæmia, and any infectious malady can give origin to them. The alleged scarlatina of lying-in women is nothing more than an erythema of the puerperium, much less often seen now when greater attention is paid to the antisepsis of the newly delivered. In tuberculosis, as in syphilis and leprosy, certain cutaneous manifestations are evoked by the simple presence in the tissues of the infective agent; such are, for example, the tuberculomata, the lepromata, and, may we add, the syphilomata. Others are determined by the action on the skin of the products of secretion of these infective agents, such are the erythemata. The erythemata of syphilis and of leprosy are known; it would be very extraordinary if tuberculosis,

so comparable to these two infections, were not accompanied by similar erythemata. Thus, there is a macular erythema in ordinary pulmonary tuberculosis; sometimes it leaves persistent traces, which may be mistaken for pigmentary syphilides. One must bear in mind that the melanodermata which spring from syphilis or tuberculosis are never primitive, as has been held, but always succeed to a more or less pronounced macular eruption. The hue of the erythema may be a dull red, or there may even be a purpuric extravasation—nay more, the erythema may be one of the early symptoms of tuberculous infection. Erythema nodosum connected with tuberculosis is well known. It has been seen recurring frequently in phthisis pulmonaris, in children of tuberculous parents, and tuberculosis following it. The tuberculous relations of the erythema induratum of Bazin are admitted, but Raymond shares the view of Thibierge, that erythema is here a misnomer, and that it should be regarded as a true tuberculous gumma. A case is cited where an eruption of polymorphic erythema appeared in an acute tuberculous seizure, lasting three weeks, forming a parallel to the mean duration of a syphilitic roseola. All forms of erythema may be seen in connection with tuberculosis, but only in the acute phase of infection; properly speaking, it originates not from tuberculosis, but from bacillosis. A series of illustrative instances are given in support of the conclusions here condensed.

VARIATIONS IN THE ELIMINATION OF UREA IN DERMATITIS HERPETIFORMIS.

RENAL inadequacy has been counted as one of the factors in the causation of dermatitis herpetiformis, but Hardouin (*Ann. de dermat. et de syph.*, Paris, November 1900) has made a series of observations which give precision to a previously vague statement. He has, in fact, established with exactitude that there is a constant relation between the variations in the excretion of urea and the eruptive outbreaks, so much so that a knowledge of the law regulating this will enable the crises to be prognosed. In two well-marked cases the whole of the urine voided during each twenty-four hours was daily collected and analysed for long periods of time, comprehending many eruptive crises. His results are best understood if the time which elapses during a period of eruption and of quiescence be divided into four parts:—

	Urea.	State of Patient.
<i>First period.</i> —Immediately preceding the outbreak.	Very marked hypoazoturia, the minimum of elimination or the commencement of the rise of the curve.	Good health, then pruritus when the crisis begins.
<i>Second period.</i> —Eruption.	Hypoazoturia less marked, or rise in excretion.	Discomfort, eruptions.
<i>Third period.</i> —Succeeding the outburst.	Azoturia normal or in excess of normal.	General health improved, fever.
<i>Fourth period.</i> —That preparatory to the outburst.	Diminution in excretion of urea.	Health good.

Thus it follows—(1) that the outbursts of dermatitis herpetiformis always occur after periods of hypoazoturia, and (2) the outburst always coincides with a considerable increase in the elimination of urea.

THE INFLUENCE OF THE RÖNTGEN RAYS UPON THE SKIN.

KIENBÖCK (*Wien. klin. Wchnschr.*, December 13, 1900) contributes an interesting paper on this subject. The reactive phenomena are not immediate, but commonly come on about two weeks after the commencement of the employment of good tubes. The quality of the tubes used exercises an important effect. A highly exhausted tube requires for the production of the Röntgen beams a current of high tension, and such as offer to the transmission of the current a high resistance are termed hard tubes. Should the tension not be enough for the grade of the vacuum, the current circulates outside, and is lost for the development of the Röntgen rays. Under-exhausted tubes oppose a lower resistance to the current, and are called soft tubes. Over-hard tubes, which are not permeated by the available tension, give out no Röntgen rays, but only electrical discharges. Hard tubes only convert a small part of the available electricity into Röntgen rays; these are of no great intensity, but have considerable penetration, and give a shadow picture offering slight contrast. Moderately soft "good" tubes give out much Röntgen light, and of a quality which gives the most useful pictures. Soft tubes give, with a current of moderate tension, Röntgen rays with no loss of electricity, and no tendency to sparking when a good conductor is near. They give a strongly contrasted picture, but cannot pass through thick parts of the body. Too soft tubes, while they allow the current to pass easily, yet do not transform it into Röntgen rays, showing only a violet fluorescence. It has been customary to employ tubes which have no means of regulating the degree of exhaustion, and have various drawbacks, but regulating ones are now procurable, and should be exclusively used. After many experiments he follows the subjoined plan. Taking a tube whose vacuum can be regulated, and using a primary current of from 3 to 6 ampères and 15 to 30 interruptions per second, he regulates the vacuum to soft or moderately soft, and passes through it a current of very high tension. This gives intense and moderately strong penetrating rays, the half of the globe is illuminated a clear green, the fluorescence screen is brilliantly lighted, and at a distance of 1 to 2 metres can shine through the thorax of an adult. The tube is placed at a distance of 15 to 25, commonly 20 cms. from the skin. With this from three to five sittings of from ten to fifteen minutes are given on alternate days, then intermitted for two or three weeks. There then appear with certainty falling off of hair or other sign of reaction—as slight injection, swelling and bronzing of the skin, oozing of a lupus patch. These phenomena slightly but rapidly increase, remain stationary for a week, then soon lessen. Only after the disappearance of the reaction is a further series of sittings to be commenced, if permanent alterations in the skin are desired. Any variation in illumination or degree, according to the individual or required grade of skin impression desiderated, can be made,

parts to be spared being protected by lead masks. He holds that the Röntgen dermatitis consists in a peculiar change in the skin, due to disturbances of nutrition caused by chemical processes. This is of various degrees—such as, accelerated desquamation of the outer epidermic layers and of the horny appendages; the nails, hair—as alopecia without visible superficial inflammation; or hyperæmia and inflammatory swelling, or vesicle formation and exfoliation with serous or purulent secretion, or destruction of the skin, dry gangrene. Vascular alterations play an important part; sometimes there is severe pain, yet the phenomena are not to be looked on as simply trophoneurotic. Regions react differently; thus the mucous membranes specially, then in a less degree the skin of the face, the dorsum of the hand and folds of the nails, the extremities and trunk. The hairy scalp permits epilation readily without trace of erythema; nevertheless the attachment of the skin to the substructure is important, the looser that is the smaller the tendency to superficial inflammation.

MULTIPLE EPITHELIOMA DEVELOPING UPON LUPUS ERYTHEMATOSUS.

It has often been remarked in medicine that when attention has been directed to apparent rarities, other instances crop up or are quoted. Pringle (*Brit. Journ. Dermat.*, London, January 1900), after citing the observation of Desbonnets, that no case of epithelioma occurring on lupus erythematosus had so far been published, proceeded to relate the history and microscopic appearances in a recurrent example which had come under his care, and added accounts of several others. The microscopical characters in his, go to prove that the epithelioma developed in and from cicatricial tissue, and not from any active "lupus" tissue. And on this he incidentally remarks, that the bulk of evidence as to the development of epithelioma in cases of lupus vulgaris points to a similar origin from cicatrix, and not from active granulation tissue by any form of epitheliomatous "transformation" or "degeneration" of its cells. The production of the growths seemed independent of any tangible sources of irritation. Hollaender (*Dermat. Ztschr.*, Berlin, December 1900) records a new instance, where the growths formed on the cheek, while Pringle's were on the scalp, though the face was also implicated. It is not quite clear whether in Hollaender's the growths arose in scar tissue or not, but the type of disease was in all cases the same, that of a squamous-celled epithelioma. He thinks that repeated irritation in treatment has much to do with the origin. While epithelioma engrafted on lupus vulgaris manifests characters of great malignancy, that appearing on lupus erythematosus, though it may appear on other areas, is a more innocent tumour. "As the degree of succulence is less in lupus erythematosus, so the tendency to degeneration and breaking down is less also." Treatment by excision may therefore be hopefully carried out.

ATROPHIA MACULOSA CUTIS.

UNDER this term Heuss (*Monatsh. f. prakt. Dermat.*, Hamburg, January 1 and 15, 1901) describes and analyses at great length a condition which may be thus defined: A chronic skin affection which appears insidiously, and is characterised by the formation of pale to bluish red painless flabby macules, or, more rarely, papules, from a linseed to a walnut in size. The epidermis over these is slightly wrinkled, but otherwise normal. To palpation they feel depressed. These slowly fade in course of weeks or months, and leave whitish, scar-like, sub-epidermic imperfections of the skin. The favourite sites are the face and outer aspect of the upper arm and the higher portions of the trunk. Most instances occur in middle-aged women. Histologically there are slight chronic inflammatory phenomena, which take origin from the vessels of the cutis, followed by circumscribed though complete disappearance of the elastin, which does not subsequently become restored. The cause seems to be autotoxic and hæmatogenous, in some cases tuberculous. It resembles somewhat the scars left by acne, but this has not preceded it. Lupus erythematosus has been seen in association with it, but the course is different, and it cannot be mistaken for scleroderma if at all closely inspected. The main diagnostic point is, that the condition is idiopathic, and not secondary to something else.

SOME UNUSUAL FORMS OF PIGMENTATION OF THE SKIN.

PIGMENTARY staining of the mucous membrane of the mouth has long been regarded as the best diagnostic sign of Addison's disease; its absence makes one hesitate; if found, its existence dispels doubt. Since 1891, however, Thibierge, Besnier, Greenhow, Danlos, and others have recorded instances where, in long-standing cases of phtheiiriasis, besides the classic melanodermia, there occurred steel-grey patches on the inner aspect of the cheeks, without any other symptom of Addison's disease. Chatin (*Ann. de dermat. et de syph.*, Paris, December 1900) relates another. This was a ragman of 78, in the greatest wretchedness and weakness, infested with innumerable numbers of lice, bronzed on the trunk generally, but not on the sites of election in Addison's disease. On the surface of the buccal mucous membrane there were many steel-coloured blotches, 4 to 5 mm. in diameter, and irregularly arranged. He complained of profound lassitude, of vague lumbar and epigastric pains, of cough, vomiting, and occasional diarrhœa. Yet in three months after his admission to hospital he had lost his cachectic appearance, had gained in weight and colour, and the pigmentary stains in the mouth, as elsewhere, had quite disappeared. The *Demodex folliculorum*, a tiny, almost immobile vermiform *Acarus*, which lives in the hair follicles, may in the pig and dog cause skin affections, very pruriginous, very severe, and almost incurable, but in man has usually been regarded as harmless. When abundantly present in the Meibomian follicles, it has been held as sometimes the cause of rebellious blepharitis. Dubrueilh, however (*Journ. de méd. de Bordeaux*, January 27, 1901), shows that it may give rise to an abnormal pigmentation of the face, resembling pityriasis versicolor. The patient was æt. 40, and complained of spots and bands

of a pale orange-yellow hue on her chest and face. These were not elevated, and did not desquamate, but on close inspection showed a rough granular aspect, due to an exaggerated prominence of the hair follicles. The free border of the lips had the scaly appearance often produced by cold. On scraping and examining in glycerin, epidermic débris and many specimens of the *Demodex* in all stages of evolution were seen. The pigmentation was always round a follicle, though, when closely set, it coalesced. He thinks that it is caused by a toxine secreted by the parasites when in sufficient numbers, and in certain persons, and is comparable to the blue-grey marks left by the *Pediculus pubis*. In his case treatment did not effect a cure, but one of Amici's yielded to soft soap.

DISEASES OF CHILDREN.

UNDER THE CHARGE OF

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CONGENITAL HYPERTROPHIC STENOSIS OF THE PYLORUS SUCCESSFULLY TREATED BY OPERATION.

DR. NICOL (*Pediatrics*, N. Y., February 1901) gives an account of the symptoms and treatment of this interesting case, which he claims as the first recorded successful case, by operation, of this condition.

The baby was 5 weeks old, and had ever since birth vomited the entire contents of his stomach in about twenty minutes after being nursed. The vomiting was a prompt and complete ejection of clotted unchanged milk, and was unaccompanied by hiccough, nausea, or pain; and, the act accomplished, the infant seemed to be quite comfortable until the pangs of hunger again made nursing necessary.

This persistent vomiting produced progressive emaciation, and through the thinned abdominal parietes considerable dilatation of the stomach was readily mapped out, and peristaltic waves were seen passing across its anterior wall from time to time. The stomach was opened by incision, and a pair of dressing-forceps was, with considerable difficulty, forced with a screwing motion through the pylorus into the intestine. The blades of the forceps were then expanded, rupturing the peritoneal coats, and widely dilating the thickened and practically completely stenosed pylorus. The walls of the stomach and the abdominal opening were then sutured, and the operation completed. The infant made a perfect recovery, the vomiting at once ceased, and the bowels, previously constipated (on account of their empty condition), commenced to act regularly. Twelve months after the operation, the child was plump and in perfect health, and was taking milk and farinaceous food regularly, and there was not the least indication of any recontraction having taken place. At the operation, the pylorus was found represented by a thickened ring of muscular or fibromatous tissue.

CONGENITAL SPASMODIC STENOSIS OF THE PYLORUS.—RECOVERY.

THE subject of this record was a well-developed baby, which was put to the mother's breast immediately after birth. On the third day, persistent vomiting was established; milk, scarcely altered, being brought up in from five to twenty minutes after nursing. Lime-water, barley-water, and even boiled water, which were substituted for the breast, were similarly rejected, even when administered by gavage. Neither limiting the time the baby was permitted to nurse, nor keeping the child at absolute rest after nursing, had the least effect in stopping the vomiting. The longest interval which occurred between the end of nursing and the rejection of the stomach contents was on one occasion about an hour, and as this took place after washing out the stomach, encouragement was felt to continue the treatment of lavage. The stools, for the first few days, consisted of meconium, but after that only small quantities of dark green mucus were passed, containing no trace of any milk residue. On the ninth day, a few well-digested fat globules appeared amongst the green mucus of the stools. As it was now evident that some milk was passing through the pylorus, the daily lavage was suspended, but the vomiting of the major part of the stomach contents continued as before. On the twelfth, thirteenth, and fourteenth days, the lavage was therefore resumed, and rather more water was used in the funnel at each filling. On the evening of the fifteenth day the baby suddenly ceased vomiting after nursing, and from that time onwards retained nourishment uniformly well, gaining weight at the rate of 1 oz. a day. Palpable tumour at the site of the pylorus could not be made out, nor was there conspicuous dilatation, nor visible peristaltic movements present, due largely to the fact that a cure was established before emaciation had advanced sufficiently to permit of those points being easily demonstrated.

Pyloric stenosis was diagnosed, for the following reasons:—(a) The early occurrence and persistence of the vomiting, uninfluenced by any measures for its relief. (b) The absence of any vestige of milk residue in the stools, while the presence of bile excluded obstruction below the duodenum. (c) Perfect digestion of milk residue when it appeared in small quantities in the stools, on the ninth day, despite the continuance of vomiting, thus precluding indigestion as a possible cause. (d) The absence of any symptoms on the part of the mother which might cause her milk to disagree with the baby. (e) The abrupt cessation of the vomiting, which pointed to a sudden relief of the exciting cause.—*Arch. Pediat.*, N. Y., January 1901.

THE TONSILS AS PORTALS OF INFECTION.

IN a long and interesting article on this subject, the author (Julius Ulman) arrives at the following conclusions:—(1) That the normal tonsil has a physiological function probably protective to the organism. (2) That being of itself often diseased, the physiological function of the tonsil is frequently impaired, and that, instead of being protective, it is the nidus for the growth and distribution of pathogenic organisms and their poisonous products into the system. (3) That many grave and

fatal general infections have their origin in the tonsils. (4) That many of the exanthemata, especially scarlatina, are of bacterial origin, in which the tonsil acts as the port of entry. (5) That acute articular rheumatism, and the disorders associated with it, namely, endocarditis and chorea, are in the great majority of cases due to the action of either bacteria or their toxins entering the general system through diseased tonsils. (6) That tuberculosis is often associated with diseased tonsils, and that the bacillus enters the system through them. (7) That the tonsil is too little examined at the necropsy, and that much light might be shed on fevers of uncertain origin by bacteriological and histological examination of it.—*Med. News*, N. Y., January 26, 1901.

CONGENITAL RICKETS.

AN interesting series of observations on the subject of congenital rickets is recorded by Fede and Cacace (*Pediatrics*, Napoli, February 1900), who carefully examined the skulls and chests in 500 babies born in maternity practice. They measured the length of the body, and took the circumference of the cranium and thorax, and also made careful observations regarding the condition of the sutures and fontanelles. As the result of these investigations, they state that, in their opinion, foetal rickets is an exceedingly rare disease. Out of the 500 cases examined, only one exhibited all the clinical signs of rickets, and craniotabes (which, however, the authors do not regard as a certain indication of rickets) was present only in four of the series. Even if these four cases of craniotabes were included, it would only give 1 per cent. of infants born with congenital rickets in a class of patients peculiarly liable to be affected by this condition, being a much smaller percentage than is frequently maintained. The authors did not regard irregularities in the sutures and fontanelles as a sign of incipient rickets, but rather as evidence of retarded or irregular development.

HEAD-NODDING.

DISCUSSING this subject, Miller (*Arch. Pediat.*, N. Y., August 1900) considers that rickets is probably the most important predisposing cause. In some cases, infectious diseases and gastro-intestinal disorders frequently precede the condition, whilst in others convulsions in the child, or in other members of the family, seem to be associated with those spasmodic movements. The author considers it very improbable that teething has any influence in their production, although the majority of cases occur between the sixth and eighteenth month, coincident with the eruption of the teeth. Horizontal lateral movements are much commoner than the vertical or nodding variety. The head is frequently cocked on one side in a very peculiar way. Nystagmus almost invariably accompanies this condition. The peculiar movements are not to be confused with habit spasm, head-banging, or other choreic affections, or with the automatic movements of the feeble-minded.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH OBSTETRICAL SOCIETY.—*March 13, 1901.*—Dr. MILNE MURRAY, President, in the chair.—SPECIMENS.—Dr. MALCOLM CAMPBELL showed for Professor SIMPSON—(a) Four fibroid tumours removed by pan-hysterectomy; (b) œdematous fibro-cystic tumour in the broad ligament; (c) right tubal gestation and left hæmatosalpinx; (d) papillomatous tumour of left ovary, simulating tubal gestation.—Dr. FORDYCE showed—(a) Ovarian tumour with twisted pedicle; (b) large dermoid ovarian tumour.—Dr. GRAHAM showed for Dr. HAIG FERGUSON a myomatous uterus, weighing 24 lb., removed by hysterectomy.

COMMUNICATIONS.—Dr. ALEXANDER BRUCE and Dr. ELSIE INGLIS read “A Case of Hydatid Mole, with Death six months after from Cerebral Hæmorrhage.” The patient, æt. 22, was delivered of a hydatid mole, on January 29, 1900. She made a good recovery, and her menstrual history in succeeding months was absolutely normal. On June 23, she was found in a semiconscious state: hemiplegic symptoms set in, and the patient died in a few days after. The post-mortem examination revealed a large hæmorrhage in the left occipital lobe. Nodules were found in this lobe, in the lungs, and in the wall of the uterus, which proved on further examination to be typical deciduoma malignum. Dr. Bruce gave a lantern and a microscopic demonstration of the specimens obtained.—Dr. BURR, Dundee, read notes of a case of deciduoma which he had under his care, and showed specimens.—Dr. HAULTAIN repeated the history of a case he had already read to the Society, and showed specimens which seemed to prove that the origin of these malignant tumours was from the epithelial layers of the chorionic villi. He preferred the names “chorio-epithelioma” and “deciduoma malignum.”—Dr. MACVIE, Chirnside, read a “Note of a Case of Spontaneous Rupture of a Varicose Vein of the Lower Extremity, at the Seventh Month of Pregnancy.” The hæmorrhage was so severe that the mother nearly succumbed to it before Dr. Macvie saw her. It, however, resulted in the death of the fœtus, which was expelled twenty-eight days later. Dr. Macvie had an opportunity of watching the exact method in which the placenta was expelled, and this he described in detail.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—*March 6, 1901.*—Mr. A. G. MILLER, President, in the chair.—Dr. BRUCE showed for Dr. AFFLECK a greatly dilated heart.—Mr. ALEXIS THOMSON showed multiple loose bodies from the knee.—Dr. DAWSON TURNER showed a Röntgen photograph of renal calculi.—Dr. CHALMERS WATSON showed microscopic specimens, demonstrating the primary importance of vascular

disease in the etiology of chronic nervous affections.—Mr. ALEXIS THOMSON read a paper on “Stenosis of the Small Intestine as a Sequel of Strangulated Hernia,” which will appear in this Journal.—Dr. EDWIN BRAMWELL read a paper on “Myasthenia Gravis.” This is a very rare disease, and is mistaken for hysteria. In all, about ninety cases have been recorded. The typical case shows the following symptoms:—The patient feels quite well in the morning, but, as the day advances, complains of difficulty in speaking, and increasing weakness of the hands and arms. Much talking increases the difficulty in speaking. The other muscles of the body get greatly weakened on exertion. There are no subjective or objective sensory disturbances. The most marked phenomenon is the rapid tiring of the muscles on exertion. The faradic current also rapidly exhausts the muscles; this has been termed the myasthenic reaction. The muscles recover perfectly after a rest. The pathology of the condition is very vague; it is possibly due to a toxine, and the motor nervous system is probably the seat of the lesion. Diagnosis depends on—(1) The weakness is not associated with atrophy, and tends to extend to all voluntary muscles; (2) the rapid exhaustion of the muscles; (3) absence of sensory symptoms. There may be temporary and even permanent improvement. It may go on to paresis of the muscles. The disease is fatal in many cases, generally by sudden asphyxia. Treatment: avoid excitement; feed early in day, when muscles are in good condition, because impaction of food is a frequent cause of death; never use the faradic current.—Dr. NOËL PATON read a note on a method of determining the influence of drugs on the liver. It consisted in estimating the amount of urea before and after the administration of the drug. Dogs were the animals experimented on.

GLASGOW PATHOLOGICAL AND CLINICAL SOCIETY.—*March 11, 1901.*—Mr. A. E. MAYLARD, Vice-President, in the chair.—Dr. A. MAITLAND RAMSAY showed a series of cases of penetrating wound of the eyeball, complicated by the presence of a foreign body. In several, the foreign body had been made out only by a skiagram. A modification of magnet was shown, for use in cases of metallic foreign body, and the demonstration was further illustrated by pathological specimens and photographs.—Dr. W. L. REID read an account of a case of papillomatous cyst of the ovary. The history of the case was peculiar, and was briefly as follows:—Seventeen years ago tumour of abdomen, subsequently disappeared, and she remained well till four years ago, when the menopause occurred; since, more or less ill; and fourteen months ago vomiting and purging, accompanied by the discharge of matter from the rectum; swelling, which had reappeared, was tapped four months ago. Abdominal section and removal of tumour, followed same day by apoplexy and death.—Mr. G. H. EDINGTON described a case of epithelioma of mammae in a cat, and showed macro- and microscopical specimens.—Dr. A. R. FERGUSON showed microscopical sections of myxoma, occurring in the epidermis of the finger. The tumour appeared after a prick of the finger.—Dr. RUTHERFURD showed a skiagram of dorsal dislocation of second phalanx of finger. The condition had been treated successfully by dorsal incision.

FORFARSHIRE MEDICAL ASSOCIATION.—*March 7, 1901.*—Dr. A. J. DUNCAN in the chair.—Dr. A. M'GILLIVRAY showed—(1) Case of "Green Vision" associated with a subhyaloid macular hæmorrhage, in a young man æt. 29. The hæmorrhage came on seven weeks ago, during straining at stool, and was of the usual shape, but only two optic discs in size. On the following day, when looking out of the window, and at a distance of 9 ft. from it, he discerned on the window pane a circular disc 3 ft. in diameter, and of a brilliant green colour. The size of the disc varied as the distance from the window. The green colour remained for twenty-one days, when it was replaced by a dark shimmering. (2) A case of subhyaloid macular hæmorrhage, similar in shape and position to Case 1, but without any green vision. (3) Case of downward coloboma of the iris, associated with extensive downward choroidal coloboma. (4) Case of upward and outward coloboma of the iris, corresponding to 10 o'clock, but not associated with any congenital anomaly. (5) Ophthalmic changes, following fracture through right anterior fossa. Right optic disc looked atrophic, but vision was $\frac{6}{9}$ ths Snellen. The right pupil retained only consensual contraction. The lesion of the nerve appeared to have involved the centripetal pupillary fibres, leaving the papillo-macular fibres apparently intact. (6) Case of thrombosis of the descending temporal retinal vein, of six vessels standing with the characteristic wheel-shaped appearance at the yellow spot, resembling albuminuric retinitis. No albumin nor sugar was found on examination of the urine. (7) Case of paralysis of the right sixth nerve, with right facial paralysis since birth, in a girl æt. 6. (8) Case of right conjugate paralysis, with the power of convergence intact and slight facial paralysis.—Dr. FOGGIE showed for Dr. G. HALLEY a girl of 15, the left half of whose lower maxilla had been excised for recurrent myeloid sarcoma in November last. There was now no deformity, and the patient was able to masticate fairly well with the right side.—Dr. W. E. FOGGIE showed a case of syringomyelia of the cervical region, in which, along with a marked muscular wasting in the upper left arm, there were associated trophic changes in the left elbow-joint.—Professor KYNOCH showed—(1) Two multilocular ovarian cysts, associated with menorrhagia of some months' duration, removed from women after the menopause. (2) Fibroma of the vagina, of the size of a lemon, growing from the anterior wall. (3) Interstitial fibroid of the uterus, nucleated through the posterior fornix. (4) Microscopic sections of adenoma of the body of the uterus, simple and malignant, hæmorrhage being the only symptom in both cases. (5) Microscopic sections of primary carcinoma of the urethra.

ANALYTICAL REPORTS.

OXINE.

SAMPLES of still another concentrated food have been sent us by the Oxine Company (Limited). One in the form of a tablet, consisting of the dried product, the other as a semisolid jelly. Oxine purports to be made from beef and from vegetables, the addition of vegetable products causing it to have a much more agreeable flavour than extracts made from flesh alone.

The oxine tablet lost 12·84 per cent. of water on drying at 110° C., while of the 87·16 per cent. of solids, 8·74 per cent. was in the form of mineral matter, leaving 78·42 per cent. of organic material. The oxine in an earthenware jar lost 26·67 per cent. of moisture. Further details are given below in a tabular form.

	Oxine in Jar. Per Cent.	Oxine Tablet. Per Cent
Water	26·67	12·84
Total solids at 110° C.	73·33	87·16
Mineral ash	10·9	9·56
Organic solids	62·43	77·60
Of the organic solids, p.c. of total solids—		
Alcoholic extractives	15·03	
Proteids—		
Coagulable	9·69	
Non-coagulable	35·98	
	— 45·67	
		60·70
Fats (ether extract)	1·73	

The foregoing analysis shows that the matters precipitated by alcohol, after the ash and fat remaining with them has been removed, amounts to 45·67 per cent., 9·69 per cent. of which is coagulated by boiling, and 35·98 per cent. soluble in that medium; while much of the extractive matter, removed by the addition of 85 per cent. alcohol, contains nitrogen. Oxine in the gelatinous form contains a marked amount of nitrogenous material, both of that useful for nutrition and of that which acts as a stimulant and as an aid to digestion. A large portion of the proteid substance also appears to be present in pre-digested forms, rendering it of easier assimilation. Its flavour is particularly good. The more solid tablet, *plus* water, forms much the same oxine solution as the oxine in jars.

TABLOIDS—BENZO-NAPHTHOL, β -NAPHTHOL, AND QUININE BISULPHATE AND POTASSIUM CITRATE (EFFERVESCENT). (Burroughs, Wellcome & Co., London.)

THIS indefatigable firm have sent us samples of yet three more tabloid preparations:—Tabloid Benzo-Naphthol contains 5 grs. or 0·324 gm.; tabloid β -Naphthol with 3 grs., or 0·194 gm.; and tabloids of the Bisulphate of Quinine with Citrate of Potassium.

There is no need at this time to say anything more as to the excellency of the firm's tabloid preparations. The first two tabloids named above afford physicians a ready means of administering intestinal antiseptics, as occasion demands, the third a far from disagreeable method of taking quinine. These latter effervescing tabloids dissolve very quickly in water, and that entirely, leaving no residue, and possessing little cinchonic bitterness. In fact, we may say that, of various examples of Burroughs, Wellcome & Co.'s effervescent tabloids, this one dissolves most thoroughly and satisfactorily.

MONTHLY NOTES ON METEOROLOGY AND VITAL STATISTICS.

By A. LOCKHART GILLESPIE, M.D., F.R.S.E., F.R.C.P.Ed.,
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METEOROLOGICAL MEANS FOR THE EAST OF SCOTLAND DISTRICT, FOR THE FOUR
WEEKS ENDING FEBRUARY 23, 1901; AND FOR THE YEAR FROM JANUARY 1.

	TEMPERATURE.			RAINFALL IN INCHES.		SUNSHINE. HOURS.		Mean Daily Variability of Temperature.
	Mean.	Accumulated Day-Degrees.		Actual.	Accumulated from Jan. 1.	Actual.	Accumulated from Jan. 1.	
		Above 42°.	Below 42°.					
Mean .	37°·6	1* 37° 2 65°	164° 331°	2·3	4·9	63	98	2°·88
Observed	34°·9	1 4° 2 19°	204° 350°	1·5	3·4	62	84	2°·62
Difference	-2°·7	1·- 33° 2 -46°	+ 40° + 19°	-0·8	-1·5	-1	-14	-0°·26

VITAL STATISTICS.

MORTALITY IN FOUR LARGE TOWNS IN THE EAST OF SCOTLAND (EDINBURGH, DUNDEE, ABERDEEN, AND LEITH), DURING FEBRUARY, AND SINCE JANUARY 1, 1901. Actual Numbers and Rate per 10,000 per annum.

	TOTAL.		CONSTITUTIONAL DISEASES.		CIRCULATORY SYSTEM.		RESPIRATORY SYSTEM.		NERVOUS SYSTEM.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899	1 1196	203·4	220	37·4	103	17·5	274	46·7	128	21·8
	2 2488	211·6	442	37·5	226	19·2	573	48·7	269	22·8
Actual Deaths and Rate per 10,000	1 1122	190·7	228	38·7	114	19·4	227	38·6	115	19·5
	2 2419	205·8	492	41·7	237	20·1	459	39·0	253	21·5
Difference from Mean	1 -74	-12·7	+ 8	+1·3	+11	+1·9	-47	-8·1	-13	-2·3
	2 -69	-5·8	+50	+4·2	+11	+0·9	-114	-9·7	-16	-1·3
	DIGESTIVE SYSTEM.		URINARY SYSTEM.		PNEUMONIA.		PHTHISIS.		CANCER.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899	1 68	11·6	29	4·9	96	16·3	115	19·6	50	8·5
	2 146	12·4	56	4·8	203	17·3	225	19·2	102	8·7
Actual Deaths and Rate per 10,000	1 76	12·9	27	4·6	88	14·9	93	15·8	59	10·0
	2 163	13·8	71	6·0	182	15·5	222	19·0	121	10·3
Difference from Mean	1 + 8	+1·3	- 2	-0·3	- 8	-1·4	-22	-3·8	+ 9	+1·5
	2 +17	+1·4	+15	+1·2	-21	-1·8	- 3	-0·2	+19	+1·6

* NOTE.—The figures¹ denotes the data for February, ² for year to date.

The four weeks ending 23rd February were distinctly colder than the average, owing partly to increase of actual cold, but more to absence of any warm days. In fact, only four day-degrees of warmth over 42° F. accumulated during the period, about 10·8 per cent. of the usual; the excess of cold degrees was 24·3 per cent. over the normal. The rainfall was deficient by 34·7 per cent., the hours of bright sunshine practically the average, and the mean daily variability of temperature slightly below the average.

The first two months of the century are conspicuous for the marked absence of warmth, only 19° over 42° F. in place of 65° having accumulated, or a deficit of 70·7 per cent. The rainfall shows a decrease equal to 30·6 per cent. of the total expected; while the number of hours of bright sunshine is also below the normal.

The total number of deaths registered in the four large towns of the East of Scotland referred to here was seventy-four below the average figuré. Deaths from constitutional, circulatory, cancerous, and digestive diseases were a little above the normal; deaths due to urinary, pneumonic, nervous, phthisical, and total respiratory causes below it. Deaths from phthisis were 19 per cent., from respiratory diseases 17·1 per cent., and from nervous maladies 10 per cent. below the average; those from cancer as much as 18 per cent. above the same. Influenza was registered as the direct cause of seven deaths; smallpox of one only, in Aberdeen, in an unvaccinated person. (Fifty-six other deaths from smallpox were recorded in Scottish cities—Glasgow fifty-four, and Paisley two; making, with thirty-five in Glasgow and one in Greenock during January, a total of ninety-three for the two months. Twenty-eight of these were unvaccinated, or 30 per cent., and of these eleven died under 5 years of age, or 39·2 per cent. of the total unvaccinated, and six between 5 years and 20, or 60·6 per cent. under 20. Of the sixty-five who died having at one time or other been vaccinated, including among these six doubtful cases, only two died under 20 years of age.)

The values for the first two months of the century present a slight decrease in the total death-rate; deficits under respiratory, nervous, phthisical, and pneumonic diseases; augmentations from constitutional (especially cancerous), urinary, digestive, and circulatory disorders. It is noteworthy that from March 1900 to February 1901 only one month has yielded a larger number of deaths from respiratory diseases than the average, *i.e.* September with +11; since the end of February 1900 no less than 494 fewer deaths have been occasioned by respiratory causes than expected. During the same period deaths from pneumonia were higher by 1·5 per cent.; from cancer by 12·3 per cent.

EDINBURGH MEDICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

THE RATIONAL AND COMPREHENSIVE STUDY OF THE HEPATIC SYSTEM.

By FREDERICK T. ROBERTS, M.D., F.R.C.P., *Senior Physician to University College Hospital; Holme - Professor of Clinical Medicine (late Professor of Medicine) at University College; Consulting Physician to Brompton Consumption Hospital; Ex-President of the Medical Society of London.*

I. INTRODUCTORY REMARKS.—The laity have always regarded the “liver” with special favour, from a morbid point of view, and at the present day it certainly has not lost its attractions, but, on the contrary, seems to be an object of ever-increasing attention and interest. There appears to be a deeply rooted and irrepressible tendency in the human mind to attribute all sorts and varieties of ailments and symptoms to this organ, often of the most opposite nature, and no matter what goes wrong in the system, from earliest childhood to extreme old age, to lay the fault at its door. It must be a familiar fact, that not only are painful or other abnormal sensations in the hepatic region or its vicinity, as well as more or less obvious biliary derangements, referred to the liver; but also subjective feelings of all kinds, general and remote, and almost every symptom definitely associated with the other important organs and systems of the body, without any regard to what their conditions may be. The modern witticism—“Is life worth living? It depends on the liver!”—really expresses concisely what appears to be a widely prevalent conviction. Further, very strange are the ideas entertained as to the etiological factors which injuriously affect this organ, and as to the nature of the morbid changes from which it is supposed to suffer,—points to which I shall have to refer more particularly later on. The outcome of all this is seen in relation to treatment, and from this aspect it requires no imagination to conclude that it is the source of much positive mischief. The

number of persons who either habitually, or on the slightest provocation, dose themselves with all sorts of drugs or preparations, often of a powerful and drastic nature, to "act on the liver," is quite extraordinary; and I have known not a few parents who do their best to train their children into this habit, even from a very early period of life. The eager desire, nay demand, of patients for remedies of this kind, under circumstances in which they are entirely contra-indicated it may be, does undoubtedly seriously embarrass the practitioner in his treatment, as has happened in my experience again and again.

The tendencies to which I have just alluded are naturally encouraged and fostered by the preposterous advertisements which flood the modern press, commending all sorts of remedies for the liver, each vying with the rest in the absurdity and audacity of its claims for universal recognition. These advertisements are really not uncommonly extremely entertaining and amusing, not only in the patronising way in which they speak about this organ, and the description they give, sometimes decidedly original though far-fetched, of the phenomena supposed to be associated with its complaints, but also in the explanation of the extraordinary ways in which the particular agent works, and the marvellous effects it produces. It would be impossible to form any calculation as to the number of simpletons who believe implicitly in all this nonsense, and who help to fill the coffers of the "discoverers" or "inventors" of these wonderful remedies, or to pay big dividends to the shareholders in "limited companies," which find "the liver" a most lucrative investment.

Now, I do not think it can be denied that the medical profession is in no small measure responsible for the erroneous ideas entertained by the laity about the liver, and for the expressions which they use in relation to this organ. Not a few of its members, by their teaching and practice, lend support to these notions beyond what is altogether rational or salutary; while they themselves are but too ready to blame the liver, in a vague sort of way, using terms which have really no definite significance, for all kinds of disturbances with which it may have no connection whatever. Moreover, apart from the question of treatment, the habit of fixing undue attention upon this organ does unquestionably lead to more or less serious errors in diagnosis, often quite needless or even inexcusable; or to uncalled-for delay in recognising the presence of important independent diseases, such as affections of the alimentary canal (acute or chronic), pleurisy, pneumonia, phthisis, morbid conditions of the heart and aorta, even aneurysm, typhoid fever, and renal disease, of all of which I have met with conspicuous examples. And, still further, there is always the danger of over-estimating the significance of a definite morbid state of the liver, or regarding it too exclusively, when it is merely a part of a case, and it may be an unimportant one.

The preceding remarks are not intended to disparage the liver in the least, or to under-estimate the important relations which it holds to the human economy, both in health and disease. Apart from its organic affections, not only may it account for various disturbances and symptoms, but there cannot be a doubt that it is essentially concerned in the pathology of certain recognised and more definite morbid conditions, such as gout and diabetes. What I maintain and urge, however, is that the organ should be regarded in a rational manner, and with some sense of proportion to actual facts. The habit of mind which impels the practitioner to fix his attention in an inordinate degree upon the liver, is not only to be deprecated from the general point of view just indicated, but is, further, obviously mischievous from the more limited or local aspect which the title of this communication suggests. That is, he is under various circumstances in constant danger of forgetting that the hepatic system includes other structures besides the liver, and is consequently liable to frequent misapprehensions and errors in diagnosis, which may be of considerable moment, as I have known happen again and again. The first point, therefore, which must be emphasised and insisted upon is, that this system does comprise other structures, all of which demand due consideration, from a pathological and clinical point of view. To make matters clear at the outset, it may not be out of place to call to remembrance the more important structures which have to be thought of when investigating the hepatic apparatus, and they may be enumerated as follows:—

1. The LIVER, with its capsule and peritoneal investment, and the ligaments by which it is supported.
2. The GALL BLADDER.
3. The BILE DUCTS $\left\{ \begin{array}{l} (a) \text{ Hepatic.} \\ (b) \text{ Cystic.} \\ (c) \text{ Common.} \end{array} \right.$
4. VESSELS and CIRCULATIONS $\left\{ \begin{array}{l} (a) \text{ Hepatic artery.} \\ (b) \text{ Hepatic vein.} \\ (c) \text{ Portal circulation and its tributaries.} \end{array} \right.$

In addition to the above, it may be noted that morbid changes affecting the lymphatic glands in the portal fissure, or the capsule of Glisson and cellular tissue, have to be borne in mind as possible causes of symptoms, by pressing upon the bile ducts or blood vessels, or perhaps upon nerves. Beyond this passing reference, however, these structures will not be further dealt with in this article, as, apart from their effects, their morbid conditions cannot be definitely recognised clinically.

Of course it often happens that one or other of the structures constituting the hepatic apparatus is alone affected in an individual case; but, on the other hand, in many instances two or more of them are involved at the same time, and their mutual pathological effects are not uncommonly quite definite and easily understood.

To any one who has a practical knowledge of the morbid conditions associated with this system, it must be a familiar fact that even grave complaints may exist, with pronounced symptoms, when the liver itself is perfectly healthy and normal in every respect, or is only involved secondarily in one way or another.

The obvious lesson which the preceding remarks lead up to is, that it is highly desirable and advantageous to study the hepatic system intelligently as a whole, and on a comprehensive basis, from all aspects—pathological, etiological, clinical, and therapeutical—and not merely to fix attention upon the liver. And most certainly, in dealing with individual cases, the only safety lies in approaching them in the first instance from this broad and comprehensive standpoint, if needless and often mischievous, or even disastrous, mistakes in diagnosis and treatment are to be avoided. The title of this communication indicates that I propose to discuss my subject on these lines, and I shall endeavour to bring out in illustration some practical facts which personal experience has taught me, and which observation compels me to say are not adequately appreciated or realised by not a few members of the medical profession. For lack of space I cannot attempt to deal with its therapeutical aspect in the present article, but hope to do so on some future occasion.

II. THE MORBID CONDITIONS OF THE HEPATIC SYSTEM.—Before the hepatic system can be dealt with satisfactorily from a clinical point of view, it is essential to have a comprehensive and fairly definite knowledge of the morbid conditions to which its several parts are liable. It may be assumed that any one who peruses this article will have acquired such knowledge during the course of medical instruction and study. Whether, however, they are always kept sufficiently clearly in mind during the investigation of individual cases, may be questioned; and as the natural outcome of my subject, I venture, before proceeding further, to present a summary of these conditions, according to the following tabular arrangement, which I have been accustomed to use in my systematic lectures, and which perhaps may be useful for purposes of reference:—

- | | |
|---|-------------|
| 1. Functional disorders and minor morbid conditions. | |
| 2. Malpositions and displacements | } of liver. |
| 3. Abnormal fixation by adhesions | |
| 4. Malformations or deformities | |
| 5. Traumatic lesions—Rupture of liver; Rupture or Perforation of gall bladder or a duct; Hæmorrhages. | |
| 6. Acute Congestive, Catarrhal, and non-suppurative Inflammatory diseases— | |
| (1) Congestion of liver. | |
| (2) Perihepatitis. | |
| (3) Interstitial hepatitis. | |
| (4) Congestion, catarrh, or inflammation of bile ducts. | |
| (5) Cholecystitis—simple; diphtheritic. | |

7. Suppurative and Gangrenous affections—Acute or Chronic—
 - (1) Hepatic abscess.
 - (2) Suprahepatic abscess.
 - (3) Suppurative pylephlebitis.
 - (4) Suppurating hydatids.
 - (5) Purulent cholecystitis—Abscess of gall bladder.
 - (6) Suppuration in portal fissure or its vicinity.
 - (7) Gangrene of liver, gall bladder, etc.
8. Acute Yellow Atrophy.
9. Obstruction of biliary ducts—Retention and Accumulation of Bile.
10. Chronic diseases of the liver and its capsule—
 - (1) Hypertrophy—Atrophy.
 - (2) Hepatic congestion and its consequences—Nutmeg liver.
 - (3) Chronic perihepatitis.
 - (4) Different forms of Cirrhosis.
 - (5) Fatty liver.
 - (6) Lardaceous or waxy liver.
 - (7) New growths and Tumours—
 - (a) Malignant.
 - (b) Benign.
 - (c) Syphilitic.
 - (d) Hydatid tumour or its remains—Multilocular Hydatid cyst.
 - (8) Special and peculiar conditions—
 - (a) Malarial and Tropical liver.
 - (b) Tuberculous disease.
 - (c) Changes associated with rickets, leucocythæmia, lymphadenoma, pernicious anæmia, etc.
 - (d) Actinomycosis.
11. Chronic conditions of gall bladder and bile ducts—
 - (1) Catarrh—chronic cholecystitis.
 - (2) Dilatation of gall bladder or ducts.
 - (3) Hypertrophy or thickening of walls.
 - (4) Accumulations of fluid—bile, mucus—Dropsy of the gall bladder.
 - (5) Compression, contraction, stricture or stenosis, or complete obliteration.
 - (6) Ulceration—Biliary fistula.
 - (7) Malignant growth.
12. Hepatic Calculus or Gallstone and its effects—Biliary or hepatic colic ; accumulation of calculi in gall bladder.
13. Conditions associated with the blood vessels—
 - (1) Obstruction of portal vein, its main divisions, or its tributaries ; portal thrombosis ; adhesive pylephlebitis.
 - (2) Dilatation of hepatic vein and its tributaries.
 - (3) Aneurysm of hepatic artery.
14. Special and peculiar parasites—*Cysticercus*, *Distoma hepaticum*, etc.
15. Morbid conditions in portal fissure.—Enlargement of glands ; chronic inflammatory or fibrotic changes.

It is not my intention to discuss individually in any way the morbid conditions just enumerated. I have thought it desirable to give a fairly complete list, but it will be obvious that several of them are of but little importance clinically, though they cannot be entirely ignored. Some of the diseases and abnormal conditions will be alluded to more particularly later on, in relation to various practical questions. There are, however, a few points to which I desire briefly to refer in the present connection.

1. The tendency which I have criticised in my introductory remarks, to attribute all sorts of symptoms to the "liver," is generally associated with the idea of some "functional disorder" of this organ. That it is liable to "functional disorders" cannot of course be questioned for a moment, and they may be of a definite and pronounced nature; but some of the cases thus designated are more correctly classed as those due to "minor morbid conditions." What the exact nature of the disturbance may be is by no means always easy to determine, and the use of such expressions as "sluggish liver," "torpid liver," "disordered liver," "weak liver," and the like, in common use, even amongst the profession, have really no definite meaning. The general notion is that the biliary function is interfered with, and the secretion of bile diminished or arrested, this being the only function with which the liver is supposed to be concerned. Hence such terms as "bilious," "biliousness," and "bilious attacks," which are in not a few instances absolutely wrongly applied. I have met with some individuals who, on the other hand, attribute their symptoms, not to deficiency of bile but to its excessive formation, and they have lamented that they belonged to a family whose special peculiarity it was to "make bile" far too readily. As a matter of fact, many, if not most of the cases referred to these categories are the result of some of the slighter morbid conditions preventing the proper discharge of bile out of the hepatic apparatus, or perhaps to its undue accumulation in the intestines, with consequent excessive absorption.

But another aspect of functional disorders of the liver is, that the organ serves other important purposes in the economy besides the mere secretion of bile, and it is certain that various symptoms may arise, even of a pronounced character, when these are not adequately fulfilled. The importance of regarding the liver from this comprehensive standpoint, in relation to its functions, must therefore always be borne in mind in practice.

A group of cases of minor disorders associated with the hepatic system may be referred to the portal circulation. This is often spoken of as "sluggish," and probably with reason. That there is not uncommonly a condition of "abdominal plethora," in which the tributaries to this circulation are over-filled, cannot be doubted, and such a condition is very likely to give rise directly to symptoms associated with the alimentary canal, and indirectly to affect the system at large.

While fully recognising the reality and importance of functional disorders of the hepatic system, I must again insist upon the necessity of always dealing with cases in which they are supposed to exist, with discretion and common sense. One grave danger which arises from the casual and thoughtless way in which liver complaints are regarded must be particularly emphasised, namely, that symptoms are attributed to functional derangement not in-

frequently when, as a matter of fact, they are due to some actual organic disease or morbid condition, it may be of a pronounced nature, associated with different parts of the hepatic apparatus.

2. "Congestion of the liver" is another expression which is in common use, but really in the majority of cases without any definite meaning, and it is frequently applied when there is no reason whatever to suppose that there is any excessive amount of blood in the organ. On the other hand, the fact must be emphasised that under certain circumstances congestion is a very important morbid condition, either acute or chronic, and if long continued it leads to further changes in the liver. Therefore, when present, it must be duly recognised clinically, and its effects watched. It is worthy of note that there may be evidence of very decided hepatic engorgement in the early stage of certain acute febrile or inflammatory diseases, which have no direct connection with the liver, and there is then a particular danger of being led into an error of diagnosis, or of attaching undue importance to what is a mere passing and subordinate morbid condition.

3. Considering the great frequency of gallstones, and the various disturbances and lesions which they produce, it is particularly necessary to bear these bodies prominently in mind in relation to the hepatic system, under all circumstances, even in young subjects and children, but especially when dealing with females, elderly persons, or fat subjects, or when the history of the case points to the more or less prolonged action of the well-known causes which predispose to their formation. Moreover, the practitioner should ever be on the alert to note any suggestive clinical manifestations of their presence; and of course still more to look for them when the phenomena are fairly significant, though not altogether pathognomonic. I feel sure that not a few cases of supposed "disordered liver," "biliousness," and the like are in reality those of gallstones; and I venture to suggest that these bodies are not always kept so definitely in remembrance as they ought to be. They certainly do sometimes accumulate in the gall bladder in remarkable numbers, before they are discovered, simply because there has never been any attack of pronounced hepatic colic. A calculus is the most important cause of obstruction of one of the ducts, but it is not the only one, and this condition, which is separately mentioned in the table, should therefore be always studied on comprehensive lines before a positive diagnosis is made.

4. An important aspect of morbid conditions of the hepatic apparatus, when studied comprehensively, is the frequency with which two or more exist in combination in the same case. They may have no apparent connection; and it is a familiar fact that the liver itself may be the seat of more than one organic disease, which may be quite independent; while sometimes a grave lesion, such as cancer, is engrafted upon a less serious condition, such as cirrhosis. In other instances, different parts of the hepatic

structures are affected by the same cause, more or less concurrently. But the point to be particularly noted in this connection is the importance of recognising the mutual relations of these structures, and of realising the frequency with which one morbid condition sets up others secondarily, so that ultimately a case may become decidedly complicated, or entirely changed in its clinical manifestations. The effects of gallstones illustrate this point in a striking way; and, apart from their more direct physical and pathological consequences, there cannot be a doubt but that there is sometimes a definite relation between these bodies and malignant disease of the gall bladder, as cause and effect. Hence it may happen that a case, which for a long period has given no occasion for anxiety, assumes unexpectedly a grave aspect, suggesting an error in diagnosis, which in reality has not been made. The lesions of the nature of ruptures and perforations, excluding those due to obvious traumatic injury from without, are practically always the result of some preceding morbid condition involving the affected portion of the hepatic apparatus.

III. ETIOLOGICAL AND PATHOLOGICAL RELATIONS.—The etiological relations of the hepatic system are of a very definite nature, as a rule, and are sufficiently well known, but I desire to offer a few general remarks on certain points. In my experience I have found it a somewhat prevalent and favourite notion that there is a strong hereditary or “family” tendency to “liver disorders,” “biliousness,” or even to actual hepatic disease; and a common expression I have heard from patients is, that they come from a “livery” or “liverish” stock. Now, I do not for a moment believe that there is any real foundation for such an idea, and that, when due investigation is made, it will almost always be found that hepatic complaints which seem to run in a family can be traced to similar habits prevailing amongst its members, or to causes to which they are unavoidably exposed. That individual predisposition exists in some instances, apart from any other obvious etiological factors, seems highly probable, but in what it consists it is difficult to determine as a rule. It may be associated with obesity or general plethora; or be attributable to the nervous system, a lithæmic tendency, or other ill-defined conditions.

Taking a comprehensive view of the more or less avoidable causes of hepatic affections, they chiefly include those associated with climate and meteorological conditions; errors in diet, especially habitually eating too much, indulgence in excess of meat or fat, or in rich dishes; abuse of hot condiments; intemperance as regards alcohol; want of exercise; and general luxurious and indolent habits—in short, habitual “high living.” In not a few instances these act more or less in combination, and at the present day it is hardly to be wondered at, considering the average mode of life, that the hepatic system is often unequal to the work thrown

upon it. Not uncommonly, however, we can fix very definitely upon one special injurious cause.

With regard to the effects of external temperature, there can be no doubt that what is often meant by "chill on the liver"—another expression in common use—is that cold from without acts directly upon this organ, through the clothing and body walls, so as to interfere with its functions, or damage it in some way or other. While there is no rational foundation for such an idea, it is quite probable that general chilling of the body does affect both the hepatic functions and circulation, and may thus produce more or less derangement, though no positive proof can be adduced to this effect. Some individuals profess to be keenly sensitive to the influence of east or north-east winds, as affecting their liver, but their conclusions cannot be relied upon, as they are just the persons who attribute every symptom to this organ. The influence of tropical climates and seasons in promoting hepatic complaints is a matter of universal experience; but it is a fact worth noting, that many spend long lives, even in very unhealthy climates of this kind, without suffering any particular inconvenience in connection with the liver, by due regulation of their mode of living, and strict avoidance of the well-known causes already mentioned which are likely to injure this organ. As to the way in which external heat affects the liver, I had an amusing illustration quite recently of the curious notions entertained on this point. A patient who had suffered from some hepatic attack informed me, on the authority of her "doctor," that "the sun had struck her liver, and scattered the bile all over her body!"

The etiological relation between want of or deficient exercise and hepatic derangements or the formation of gallstones, is sufficiently attested by general experience, especially when aided by dietetic causes. In an address delivered before the North-West London Clinical Society,¹ Sir Lauder Brunton, calling attention to the well-known fact that bile is excreted under very low pressure, affirmed that this secretion needs to be squeezed out of the liver, and that this is effected by active respiratory movements, the organ being compressed between the diaphragm and the contracting abdominal muscles. He maintained, further, that the want of some particular kind of exercise, which promotes the movements of these structures, accounts for many people being "bilious." On this ground he insists upon the advantages of different forms of exercise as preventive measures, such as climbing hills, rowing, drill movements, or the use of Sandow's or Whiteley's exercisers. The value of these kinds of exercises in relation to the hepatic functions cannot be doubted, but whether this simple explanation of their mode of action is correct is by no means so certain, with all due respect to such an eminent authority.

¹ See *Clin. Journ.*, London, Jan. 10, 1900.

The injurious effects of alcoholic excess upon the liver have been generally acknowledged from time immemorial, and they have been recognised as being of a very definite nature. At the present time some writers and pathologists have attempted to minimise the importance of this etiological factor. Against such a tendency I feel bound to take this opportunity of uttering a strong and emphatic protest. The disastrous consequences of intemperance, especially of certain aspects of abuse of alcoholic drinks, in relation to the hepatic system, both as regards temporary disorders and permanent grave organic disease, are but too evident and familiar on all hands, and it would be most dangerous for the community at large, if the medical profession should ever come to speak hesitatingly on this point. Apart from open intemperance, secret drinking of strong spirits is accountable for not a few "bilious attacks," which may culminate in sudden or acute symptoms, indicating the insidious development of serious organic mischief in the liver, amongst them profuse hæmatemesis, which is then sometimes erroneously attributed to "gastric ulcer."

It is worthy of note that different individuals present remarkable differences as to the effects of alcohol upon the hepatic structures. In some instances, a very moderate indulgence, hardly amounting to intemperance, seems to damage them speedily and profoundly. On the other hand, I have known not a few cases in which these structures appeared to resist, in a striking degree, the injurious effects of extreme and prolonged excess in the use of alcoholic drinks of all kinds. I believe that these differences can, to a great extent, be explained, but I do not propose to pursue this point further here.

The hepatic system is one of the chosen seats for the manifestation or development of certain morbid conditions which have a definite and well-known etiological or pathological origin. Under this group may be mentioned hydatid tumour, albuminoid disease, the effects of malaria, malignant growths, and syphilitic disease. Tubercle does affect the liver, but in my experience it has seldom, if ever, been of any clinical importance. The peculiar parasites met with in connection with the hepatic apparatus have a recognised origin, but in this country, at any rate, they are of but little, if any, practical consequence. Hepatic abscess has, in most cases, a definite etiology and pathology in its relation to dysentery, or the amoeba associated therewith. The origin and causation of acute yellow atrophy are still very obscure, but though the subject is full of interest, it cannot be discussed here.

There are certain etiological relations of the hepatic system which I desire now more particularly to discuss, because, though of obvious and very considerable practical importance, they are by no means as adequately appreciated and understood in ordinary practice as they ought to be.

1. This system receives, as a rule, but scant attention in cases

of either of the acute specific diseases with which we are familiar in this country, and yet several of these affections may lead directly or indirectly to morbid conditions of different kinds connected therewith, which are either immediately serious, or lead to more or less permanent damage, the effects of which are revealed later on. It is a well-known fact that even in the mere febrile state, and still more in certain "fevers," the liver is very liable to be disordered in its functions, or "congested," and the latter condition sometimes becomes very pronounced, as in severe cases of enteric or scarlet fever. Catarrh of the ducts, or even of the gall bladder, is also not uncommon, and the former probably accounts for most cases of the more or less marked jaundice which sometimes occurs in the course of these complaints, as well as in pneumonia and other acute febrile affections. Acute degeneration of the liver is undoubtedly another important pathological and clinical factor in some instances, but one seldom realised or even thought of. As possible accidental complications, hepatic abscess or other suppurative lesion must be borne in mind in connection with this class of cases, due to septic infection from some more or less distant source. As mentioned in the table, a distinct diphtheritic membrane occasionally forms in the gall bladder, and possibly in the bile ducts, which may produce symptoms. Ulceration of the gall bladder is a recognised though exceptional lesion in typhoid fever, and it may terminate in unexpected perforation. Lastly, the morbid changes which may be developed in the liver in severe cases of scarlatina are worthy of special attention, and should not be forgotten. It is an established fact that an acute interstitial hepatitis is not uncommonly associated with this disease, which may not only be of immediate consequence, but is liable to lead to permanent damage of a cirrhotic nature. The observations of Dr. Michell Clarke on this matter are highly interesting and important from a practical point of view. It is very probable that some cases of cirrhotic liver in young subjects, which cannot otherwise be accounted for, have thus originated, and careful inquiry in this direction may perhaps clear up the etiology in such doubtful cases.

2. The etiological and pathological relations of the hepatic apparatus to the alimentary canal are on the whole well known, but the effects of the former upon the latter are much more frequently recognised than the opposite. There can be no doubt that disorders and diseases of the stomach or intestines often affect the hepatic system secondarily, and may thus lead to more or less serious damage, a relationship by no means appreciated to the extent that it ought to be. If the views entertained at the present day as to the functions of the liver are correct, it must follow that even ordinary cases of "dyspepsia" or "indigestion" are likely to derange these functions more or less, and thus to give rise to temporary unpleasant consequences, to say the least,

not improbably explaining the phenomena of many so-called "bilious attacks." It has been maintained that prolonged indigestion may actually set up a cirrhotic condition, and I have met with cases strongly supporting this view. That the hepatic structures are liable to be involved secondarily in various ways, in connection with organic diseases of the alimentary canal, hardly needs any demonstration, though some writers have endeavoured to minimise the importance of this fact in certain directions. A catarrhal condition of the duodenum does undoubtedly tend to block the opening of the bile duct, or to spread along it, thus causing so-called "catarrhal jaundice." The relation of hepatic abscess to dysentery, or other ulcerative and suppurative lesions affecting the alimentary canal, is obvious enough in not a few cases, and easily understood. I have had the opportunity in two or three instances of tracing abscess in the liver, the origin of which could not be explained during life, to an ulcer in the intestine, not dysenteric or of any other specific nature. Secondary malignant disease of the liver, following similar gastric or intestinal mischief, is another familiar illustration of the fact now under consideration.

Another aspect of the etiological relationship of the alimentary canal to the hepatic system, which, in my opinion, is of essential importance, and to which I desire to draw particular attention, is the injury that may result from pronounced chronic or habitual constipation, or, in other words, from persistent neglect of a healthy action of the bowels. Now, a frequent tendency, both with the medical faculty and the laity, is undoubtedly to refer constipation entirely to some interference with the biliary function, and consequently the common demand, which is carried out in practice, is for some drug or combination to "act upon the liver," so that the increased flow of bile may overcome the difficulty in the bowel! The idea never seems to suggest itself that it may be the other way about, and that the hepatic functions may be materially helped by getting rid of accumulated feces in some other way, and by taking pains to prevent constipation, and to see that there is a satisfactory daily alvine evacuation. Moreover, neglect of the bowels is undoubtedly a frequent and potent factor in the production of gallstones, and they demand particular attention from this point of view. It is an acknowledged physiological fact that a large amount of bile is being constantly reabsorbed from the intestines, and if the secretion is pent up by accumulated feces, such absorption must necessarily take place in an excessive degree, with untoward consequences. Further, by keeping the bowels as free as possible, the discharge of bile through the ducts into the duodenum is likely to be indirectly promoted, and any tendency to accumulation in these ducts, the liver, or the gall bladder, will thus be materially obviated.

It will suffice to mention, in further illustration of the

etiological relations of the intestines to the hepatic system, those very exceptional cases in which an intestinal worm gains access into the common bile duct, thus blocking it, and giving rise to obstructive jaundice.

3. Another practical aspect of the causation of affections of the hepatic system, regarded comprehensively, is the liability of certain of its structures to be interfered with, or to be involved secondarily in organic lesions, by extension or in other ways, in connection with diseases in the vicinity, altogether apart from the alimentary canal. I have met with not a few cases in which this relationship has been entirely overlooked, and the true significance of hepatic symptoms completely misunderstood. That is to say, pronounced jaundice, ascites, or both, have been regarded as due to primary disease of the hepatic structures, and treated from that point of view, when really resulting from some neighbouring morbid condition, which has pressed upon or implicated the bile duct, portal vein, or both. These remarks apply more particularly, but by no means exclusively, to pancreatic disease, especially of a malignant nature, but it may be mere chronic pancreatitis; and to peritoneal changes, leading to adhesion and thickening. In obscure and doubtful cases, therefore, where definite hepatic symptoms are present, this possible mode of origin should always be prominently borne in mind.

4. I take it for granted that, theoretically, every well-informed medical practitioner is familiar with the secondary pathological effects associated with the hepatic structures which so often follow, and are the more or less direct consequences of venous intrathoracic morbid conditions, especially certain affections of the heart or pericardium. Here again, however, my observation compels me to state that this etiological relationship is quite commonly practically ignored; and an "enlarged liver," actual or supposed, is, for example, dealt with as an independent condition, and treated accordingly. As a matter of fact, the organ is in many instances not enlarged at all, but "displaced" downwards, a point which will be more fully emphasised later on. As the result of different degrees of obstruction to the venous circulation, and its more or less prolonged duration, we have to be constantly on the look-out for temporary or permanent hepatic congestion, "nutmeg liver," various grades of cirrhotic change, the "pulsating liver" in exceptional instances, and ultimately for the effects of portal congestion or obstruction. It is worthy of note that in some cases belonging to the present category, other causes acting directly upon the liver have been at work, especially alcohol, and have contributed to the development of morbid changes in this organ.

Before leaving the subject of the etiology of affections of the hepatic apparatus, it is important to call attention to the fact that cases are sometimes met with in which pronounced and serious

disease of the liver exists, which cannot be accounted for, or referred to any definite cause or combination of causes, after the most careful and exhaustive inquiry as to the patient's past history. Certain morbid changes may be expected in advanced age, which belong to this category. Cases of malignant disease of the liver have come under my observation which seemed to point distinctly to intense and prolonged worry or anxiety as the chief etiological factor. I have never been able to trace this condition to external injury.

(*To be continued.*)

MALIGNANT DEGENERATION OF THE VILLI OF THE CHORION—SYNCYTIOMA MALIGNUM.

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(PLATES XIII.-XIV.)

It is difficult to decide whether syncytioma malignum should be regarded as an obstetrical or a gynæcological subject. As a tumour peculiar to woman it falls naturally into the domain of gynæcology; but, on the other hand, it stands in such close and intimate relationship with the pregnant state that it may justly be regarded as an obstetrical complication—a something to be treated of in the pathology of pregnancy or the puerperium. Though it finds a place in all up-to-date volumes on gynæcology, it is also described and discussed in most modern books on midwifery. The precise relationship of the tumour to pregnancy we shall discuss later; meanwhile, let it suffice to say that pregnancy of some sort is a necessary and inseparable precursor of that form of malignant neoplasm known generally as syncytioma or deciduoma malignum. So many admirable historical résumés of the early descriptions of tumours of this nature have been published, that it would be superfluous to indulge in still another here. Of recent years, the clinical and microscopical observations on the course and nature of the disease have increased so voluminously, that any writer on the subject has enough material for analysis at his hand, without having to lend body to his disquisition by prefacing it with the hackneyed details of the first five or ten cases described by Säger, Gottschalk, and others.

Since attention was first directed to the matter by Säger⁽¹⁾, between ninety and a hundred cases, all corresponding more or less closely with the originally described form of the disease, have been put on record. Of these, by far the majority has come from German sources. I have been able to obtain access, in the literature at my command, to descriptions of seventy-eight cases, and for the greater part this paper will be devoted to a critical

study of these. Over the whole subject there hangs an obscurity which a careful analysis of so many cases should do something to dispel.

As a preliminary to the discussion, let us look at the clinical picture of a case of the disease.

Clinical phenomena of a typical case.—The patient is a woman at any stage of the reproductive cycle. She may have been pregnant one or many times. She may belong to any social grade, and have lived an arduous life or one of ease. Her personal habits may present no feature calling for particular remark. She may show no special hereditary tendency. Her previous history may, from the point of view of health, be an excellent one. She comes complaining of menorrhagia and metrorrhagia. Inquiry elicits the fact that at some date, more or less immediately before the commencement of the bleeding, she has given birth to a full-time child, or had a miscarriage, or aborted, or discharged spontaneously a hydatid mole, or had one removed artificially from her. A placental polypus may also be the immediate precursor of the disease. The miscarriage or abortion may depend on unknown causes, or be directly traceable to some shock or injury, as in Sanger's first case, where the abortion preceding the development of the tumour was due to the patient's stumbling on leaving a railway carriage; or it may be the result of some constitutional disease, such as syphilis; or be due to some displacement of the uterus, as in a case reported by Gottschalk ⁽²⁾. The bleeding is irregular in quantity, and no rule seems to characterise its intermissions. At one time it is a mere dribble, at another it is a sudden and profuse hemorrhage which is extremely difficult to control, and which may threaten the patient's life. Most often the patient makes no complaint of pain, but should that symptom be present it is usually localised in the sacral region. As a consequence of the repeated hemorrhages, the patient is as a rule profoundly anemic, and her anemia brings with it its usual train of symptoms, namely, pallor, headache, weakness, breathlessness on exertion, palpitation of the heart, and functional cardiac and circulatory bruits. A careful examination fails to discover any constitutional cause for the menorrhagia. By and by one finds that a foul-smelling uterine discharge is in many cases beginning to intermit with the hemorrhage. The temperature of the patient begins to rise above normal, and to fluctuate inside three or four degrees. The pulse becomes small and rapid. Gradually the invalid passes into a condition of cachexia.

A cough may arise; and it is sometimes associated with a purulent or hemorrhagic expectoration. An examination of the respiratory system will then most frequently bring to light little areas of dulness in the lungs, over which the breathing is bronchial in character, with rhonchi of various kinds for accompaniments. Indeed, the examination of the respiratory system,

taken in conjunction with the general phenomena of increasing emaciation and fluctuating temperature, may give rise to the suspicion that the patient is suffering from acute pulmonary phthisis.

Constitutional causes for the menorrhagia and metrorrhagia having been excluded, one would naturally proceed to make a gynaecological examination.

Inspection of the breasts and abdomen will show that the patient is a parous woman, unless she has had only one gestation, which did not advance sufficiently far to produce that degree of distention necessary for the production of the *striae gravidarum*.

On abdominal palpation we may feel a smooth lump—the enlarged uterus—projecting for some distance above the upper margin of the symphysis pubis.

On vaginal touch one may feel in the walls of the passage a solitary, or multiple small lumps. They vary considerably in size, and are of soft consistence. They are slightly movable. Their surface may be uneven, or, if covered by mucous membrane, smooth. If the mucosa is involved the lumps readily bleed. The vaginal portion of the cervix uteri often feels soft. The external uterine os may be closed or gaping.

Bimanual examination shows the uterus to be considerably enlarged and of softer consistence than normal. It is freely movable. If the cavity of the uterus is accessible to the examining finger, one can feel, in most cases, a spongy mass of varying size adherent to the uterine wall at what had probably been the placental site during the preceding gestation. The tumour is usually sessile, its surface is uneven as a rule, it bleeds readily, and fragments may easily be detached from it; or, instead of a single tumour, one may feel a number in the uterine wall.

When we can introduce a finger into the uterine cavity, there is little use of completing the examination by having recourse to the sound. But where the cervical canal is too narrow to permit of a digital exploration of the uterus, we may employ the uterine sound, from which we learn that the cavity of the uterus is lengthened and widened; the organ is freely movable; and the soft uneven tumour which partially fills its cavity is easily provoked to hæmorrhage. If no active treatment is carried out, the patient's condition rapidly deteriorates. The emaciation and weakness increase. The tumour continues to grow larger; the pulmonary condition becomes more aggravated; other metastasis may arise; and usually within twelve months of the inception, or rather the discovery of the disease, the patient succumbs. Such, in brief, is the outline of a typical case of this rapidly fatal disease. We shall not, in this place, give an account of the pathological conditions found post-mortem. That will best come when we proceed to consider the nature and origin of the elements which constitute the tumour.

The age-incidence of the tumour.—As I have already pointed out, the disease may be met with in women at any stage of their reproductive life. The seventy-eight cases which I have been able to collect, yield the following results when analysed as to age:—

Patients between 15 and 20 years of age=	2	(one 17 and one 18 years old).
“ “ 20 and 25 “ “ “	=	9
“ “ 25 and 30 “ “ “	=	18
“ “ 30 and 35 “ “ “	=	15
“ “ 35 and 40 “ “ “	=	9
“ “ 40 and 45 “ “ “	=	11
“ “ 45 and 50 “ “ “	=	4
“ “ 50 and 55 “ “ “	=	4
Cases in which ages was not stated	=	6
Total	78	

The average age of the above patients was 33·1 years.

From a scrutiny of the above figures it will be seen that most of the cases fall into the second decennium of the reproductive cycle; for between the ages of 25 and 35 we have to deal with thirty-three cases, while in the next ten years of reproductive life we meet with only twenty cases. There is a very marked falling off from these figures both at the beginning and at the end of reproductive life. It is particularly interesting to note that most of the cases occur in women between the ages of 25 and 35—the period of a woman's life when pregnancy is ordinarily most frequent. This coincidence was to be expected, since conception is a necessary forerunner of the disease.

It is also instructive to observe that at the climacteric age there are comparatively few cases. This is, of course, largely attributable to the fact that conception is then an infrequent occurrence. But it is further of interest, because it is at that age that the ordinary malignant tumours of the body of the uterus are most frequently met with. Gebhard⁽³⁾ states that sarcoma uteri occurs most frequently at the period of the menopause, and with this idea the statistics of Gusserow⁽⁴⁾ are in entire accordance. He found that sarcoma uteri was met with in a series of cases as follows. It will be readily seen that there is a large preponderance of cases about the climacteric age.

Gusserow's Statistics re the Age-incidence of Sarcoma Uteri.

Before	20 in	4 cases.	From 40 to 48 in	28 cases.
From 20 to 30 “	5 “	“	“ 50 to 60 “	18 “
“ 30 to 39 “	15 “	“	Above 60 “	3 “

It is a matter of common knowledge that carcinoma of the corpus uteri is also a disease met with most often about the time of the menopause. Krukenberg⁽⁵⁾ found that the average of women who were operated upon for corporeal uterine carcinoma was about 54 years. Gusserow's statistics⁽⁶⁾, based on an analysis of nearly 3500 cases, further bear this out.

He found—

One case at . . . 17 years.	1196 cases between 40 and 50 years.
„ „ „ . . . 19 „	856 „ „ 50 and 60 „
114 cases between 20 and 30 „	340 „ „ 60 and 70 „
770 „ „ 30 and 40 „	193 „ above 70 „

In the heated discussion that has raged ever since Säger first described his case, as to whether syncytioma malignum is to be regarded simply as a carcinoma or sarcoma of the body of the uterus with pregnancy superimposed as a complication, it seems to me that too much attention has been paid to the microscopical characters of the tumour cells, and too little to the age-incidence of the disease.

There is a striking difference between the ages when syncytioma malignum on the one hand, and sarcoma and carcinoma of the corpus uteri on the other hand, are met with. Has the difference no significance?

The precursor of the tumour.—If we consider the age of the patients in the light of what precedes the tumour, we obtain the following instructive results.

As already stated, the tumour was met with in two patients under 20 years of age. In their cases the precursor of the neoplasm was, in one instance, thought to be a tubal gestation, and in the other a hydatid mole expelled at the second month.

In patients between 20 and 25 the tumour was preceded by	{	Hydatid mole,	5 times.
		Abortion,	2 „
		Full-time child,	2 „
„ „ 25 and 30 „	{	Hydatid mole,	8 „
		Abortion,	4 „
		Full-time child,	6 „
„ „ 30 and 35 „	{	Hydatid mole,	5 „
		Abortion,	3 „
		Miscarriage,	1 „
„ „ 35 and 40 „	{	Full-time child,	6 „
		Hydatid mole,	2 „
		Abortion,	1 „
„ „ 40 and 45 „	{	Full-time child,	6 „
		Hydatid mole,	7 „
		Abortion,	2 „
„ „ 45 and 50 „	{	Full-time child,	2 „
		Hydatid mole,	7 „
		Abortion,	0 „
„ „ 50 and 55 „	{	Full-time child,	0 „
		Hydatid mole,	4 „
		Abortion,	0 „
		Full-time child,	0 „

In some of the above cases there is a history of placental polypus having followed the termination of the gestation, and it was only after the removal of this that malignant symptoms arose (*e.g.* Freund's case (7)). But in drawing up the above statistics I have considered simply the character of the preceding *gestation*; for it is probable that in many cases placental remnants, which were not observed, were left behind *in utero*; and to take special

note of those cases in which placental polypi were found, would be to introduce a source of fallacy into our calculations.

We see from the above tables, that at all ages, with the exception of the decennium between 30 and 40, the most frequent precursor of syncytioma malignum is the hydatid mole. We must not lay too much stress on the single aberration from the universal law. With more cases to make deductions from, this apparent deviation would probably be corrected.

It is a fact of striking importance that between the ages of 20 and 30, when hydatid mole is not often met with, that condition should be the most common forerunner of malignant neoplasm.

Kehrer ⁽⁸⁾ concludes, from the study of a large number of cases, that hydatid mole, as a rule, affects women of a more advanced age. May there not be some proclivity, as yet unsuspected, for the hydatid mole to initiate a malignant process when it occurs at a period of life other than the "Age of election."

In the period between 45 and 55 years, syncytioma malignum was, in all the cases I have collected, always preceded by myxoma chorii. In a way that was to be expected, for hydatid mole is frequent between these ages, while an ordinary conception resulting in an abortion or a full-time labour is a great rarity.

At all ages, a full-time child is, after hydatid mole, the chief antecedent to this malignant degeneration, and abortions come next in frequency. When we come to consider the precise relationship between pregnancy and the neoplasm, we shall discuss this matter more fully.

All over, the cases I have collected yield the following results:—

Hydatid mole preceded the disease in 38 cases.

Parturition at term ,, ,, 24 ,,

Abortion ,, ,, 15 ,,

—and of these fifteen, three were tubal.

Premature labour preceded the disease in one case.

These figures harmonise with the statistics of Ulesco-Stroganowa ⁽⁹⁾, who found in forty cases which he subjected to analysis, that fifteen were preceded by hydatid mole, eleven followed a full-time birth, six succeeded on abortions, and three developed in the train of tubal gestations.

In my collection of cases, the average date at which the abortions took place was the fourth month,—while the hydatid moles were expelled spontaneously, or cleared out, as a rule, before their fifth month was completed. Some were discharged as early as the second month, others remained *in utero* till the eighth or ninth month. The time of their expulsion is distributed fairly evenly from the second to the ninth month, and one has no ground for supposing that a mole discharged at any particular month is more likely to be followed by the malignant disease than a mole

one by Löhlein. In Hollemann's cases the tumour was not discovered till, in one instance, four and a quarter, and, in another, two years after the molar pregnancy ended. Löhlein's case also followed on a molar expulsion two years before. If these were true cases of syncytioma malignum there must have been some interrupted and unsuspected gestation between the time when the hydatid mole was expelled and the malignant neoplasm was observed; or remnants of hydatid mole must be capable of setting up malignant processes after a very long period of latency.

The above table shows that on an average a period of only four weeks separates the earliest from the latest date when the first symptoms appear.

In pointing this out, I do not for one moment bind myself to the opinion that the appearance of the symptoms corresponds precisely with the date at which the tumour began to develop. Most malignant tumours have an insidious course, and a latent period of varying length intervenes between their genesis and their manifestation.

In the preceding pages, I have, I think, established beyond a doubt, that a very precise relationship exists between pregnancy and the tumour. Whether we have to deal with a carcinoma or a sarcoma of the corpus uteri existing before the inception of pregnancy, or developed during its course, and only recognised after the uterine contents have been expelled, or whether we have to do with an entirely new form of malignant disease, will best be discussed when we have studied the pathological anatomy of the tumour, and made a careful analysis of the cell elements it contains.

I have already given a clinical picture of a case of the disease, but a more elaborate study of the individual symptoms in the light of my collection of cases will prove instructive.

Hæmorrhage is usually the earliest and chief symptom of the disease. It was present in all the cases I have collected but three, and in the majority was the first symptom. An interesting exception is Sängers's case, where there was hæmorrhage so long as the abortion preceding the tumour was incomplete. But after the uterus was thoroughly cleared out the bleeding ceased, and though the tumour developed thereafter there was never any hæmorrhage during its growth. Post-mortem, the uterine mucous membrane was found intact.

In my cases the hæmorrhage appeared, as a rule, from four to eight weeks after patient's gestation terminated. In some cases the bleeding began so closely on the heels of the confinement or abortion that there was reasonable ground for supposing it was due to the incomplete removal of the uterine contents. In other cases the hæmorrhage began after an interval, during which the patient showed no signs of uterine disease.

Now and then it began in association with the return of the

menses, and recurred at irregular intervals. As a rule, it commenced as a trifling loss, but before the disease had progressed far there was usually a tremendous increase, both in its frequency and quantity. Nové-Josserand and Lacroix (¹⁰), who have devoted particular attention to the question of the hæmorrhages, believe that the bleedings caused by the syncytioma are more important and severe than those which usually attend the development of the ordinary uterine tumours. It has been pointed out that, in quantity at least, they resemble very closely the flooding which accompanies an abortion.

As is easily understood, the prolonged drain produces profound anæmia, which may menace the patient's life. In my collected cases there were several instances of syncope from the hæmorrhage on record, and at least one death.

In no case was the hæmorrhage a continuous one. In all it was irregularly intermittent—no fixed time intervening between its recurrences. Its duration also seemed subject to no rule. The blood lost was, for the greater part, pure blood. Stagnation in the uterus or vagina gave rise in some cases to the formation of clots; and in others there was mixed with the fluid, cellular débris and fragments of neoplasm. But, as a rule, the hæmorrhage was a purely fluid one. The source of the blood will be readily understood when we come to study the pathological anatomy of the tumour. Part of it comes from the capillaries of the uterine mucosa, but the greater part of it probably comes from the vessels deeper in the uterine wall whose coats are broken through by the advancing tumour cells. Most likely each profuse hæmorrhage is coincident with the successful penetration of the walls of one of these deeper vessels by the tumour cells.

This will explain the difficulty with which the hæmorrhage is controlled, for if its source is deep-lying, it is out of the reach of local applications, and pressure cannot readily be applied to it. In many cases curetting, undertaken in the belief that the hæmorrhage was due to some relic of the previous gestation, has arrested the bleeding for a time. But it has almost invariably recurred sooner or later. The explanation of this phenomenon is a difficult one, but it may be that the mucous membrane invaded by the tumour having been removed, no further bleeding takes place till the fresh vascular mucosa comes again under the banal influence of the neoplasm.

Intermitting with the hæmorrhages there is a serous discharge, which in the later stages of the disease is extremely malodorous. As already pointed out, the long-continued hæmorrhages give rise to the general symptoms of anæmia. In most of my cases there was, further, a great loss of flesh, with a marked diminution of natural vigour, mental depression, and loss of appetite.

Pain would not seem to be a very constant symptom of the disease, if one can make such a deduction from the rarity with

which it was mentioned in the records to which I have had access. When present it is usually concentrated over the sacrum, but fortunately it is not of that agonising character which is one of the most distressing features of malignant disease of the cervix uteri. In one of Gebhard's cases (¹¹), severe pain in the hypogastrium was, after hæmorrhage, the most important symptom; and in another, reported in the same paper, there was abdominal pain—the sacral pain amounting the while to little more than a sense of bearing-down.

It is to be expected that where metastatic growths come into relation with nerve elements pain will be produced. In due time, in most cases, there are developed secondary growths in various organs, and these naturally produce characteristic symptoms.

In some of the cases I have collected no metastases were found. In others, permission for only a partial post-mortem examination was granted, so, many secondary growths may have escaped observation. In some of the reports no mention is made either of their presence or absence. In considerably more than half my cases the metastases were multiple—involving not only several organs but several separate foci in these organs.

The commonest sites were—the lungs, affected in thirty-three of my cases; the vagina, in seventeen; the spleen, in eight; the liver, in six; the kidneys, in six; the ovaries, in four. The intestines were affected in three of my cases, the lymph glands of the abdomen and pelvis were affected in three cases also. The broad ligaments, the pelvic connective tissue, the bladder, the mesentery, the femur, and the brain were affected each in two cases. In a case of Marchand's (¹²), as also in a case of Apfelstadt and Aschoff (¹³), there was a metastatic growth in one of the labia majora. The pancreas, the stomach wall, the pericardium, the diaphragm, the ribs, and the connective tissue in the gluteal region, were affected each once. In a case reported by Mengé the bronchial glands were affected, as were also the inguinal glands in a case of v. Franqué's. Gebhard (¹⁴) says that the most frequent site of metastasis is in the vaginal walls, and after that in the lungs. With this opinion the above figures do not accord.

In ordinary carcinoma or sarcoma uteri the vaginal walls are not nearly so often affected by metastasis; but as syncytioma malignum is developed in such close relationship to pregnancy, the veins in that region lend themselves very readily to the reception of fragments from the primary tumour.

One is struck by the fact that secondary growths in the liver are relatively so infrequent. It is not so in the case of ordinary sarcoma or carcinoma. Can it be that liver tissue does not offer a very suitable nidus for the development of cells from a syncytioma malignum?

Naturally these secondary growths produce characteristic results according to their situation, but occasionally symptoms

which make one suspect secondary deposits in other organs, disappear when the uterus is removed. Two instances of this sort we have in the cases of Gottschalk ⁽²⁾ and Otto von Franqué ⁽¹⁵⁾. In these there was a cough which raised vigorous suspicions of pulmonary involvement, but, disregarding this as a contra-indication to local operative measures, the uterus was extirpated in both cases, and the cough disappeared permanently. It was therefore probably merely a reflex phenomenon caused by the tumour in the uterus.

Special interest attaches to the fact that in several instances metastases developed in lymphatic glands. They occurred in the inguinal glands on both sides in von Franqué's case ⁽¹⁵⁾; in the retroperitoneal glands in a case of Gebhard ⁽¹¹⁾; in the bronchial glands in Mengé's case ⁽¹⁶⁾; and in the pelvic glands in other cases. The implication of lymphatic glands lends support to the idea that the neoplasm is of carcinomatous rather than of sarcomatous nature.

Termination of the disease.—If, after the nature of the disease has been recognised, radical steps are not taken for its removal, there is a rapid degeneration in the patient's condition, which ends invariably in death. It is one of the most painful as well as characteristic features of the disease, that it can cut down with appalling rapidity women in the flower of life who have always enjoyed excellent health. There is no other malignant tumour of the uterus which produces a fatal result with such uniform rapidity.

Some of the cases I have collected were, after radical operation, quite free from any signs of recurrence up till the time they were published. But these were exceptional cases. In a majority, death followed in spite of the operation, and the extirpation of the organs primarily diseased only delayed, but did not arrest, the fatal termination. In cases not operated upon, the average time that elapsed between the appearance of the first symptom and the death of the patient was 5·5 months. In those cases subjected to radical operation, in spite of which death occurred, the average time that intervened between the first evidence of the disease and its termination was 9·6 months.

The immediate cause of death may vary—(1) It may be hæmorrhage; or the continued hæmorrhages may so reduce the condition of the patient that she falls an easy victim to some infectious malady. (2) It may be due to metastasis of the tumour elements to vital parts, as in Gebhard's case ⁽¹¹⁾, where to all appearance the secondary growths in the brain were the immediate cause of death. (3) It may be due to cachexia, resulting from the by-products of the tumour growth. (4) It may be due to a septic intoxication superimposed upon the original disease by manipulations undertaken for its recognition or removal. It has been frequently noted in the list of cases recorded, that the disease ran

an afebrile course till intra-uterine investigation had introduced, or at least facilitated the entry of, germs into the uterine cavity. As the tumour is of such a hæmorrhagic character, there is naturally an admirable nidus inside the womb for the multiplication of pathogenic germs. A very slight septic intoxication, superadded to the cachexia already existing, will easily determine the patient's death. Where septic material is introduced into the cavity of the uterus at an early date, before there is any suspicion of the presence there of a tumour, the symptoms of the sepsis may so mask those of the neoplasm that it may remain undiscovered. In this we have the probable explanation of the fact that syncytioma malignum has not been more frequently observed by the general practitioner. He is apt to think that the early symptoms produced by the tumour are due to a piece of retained secundines. He explores the uterus, and in doing so introduces some organisms whose development hides the train of symptoms produced by the tumour; septicæmia follows, and all the subsequent symptoms are ascribed to it, the malignant neoplasm growing the while unsuspected. (5) Death may follow, and be caused by the operation undertaken for the patient's relief. The immediate cause may be shock, acting on an organisation already profoundly weakened; hæmorrhage, or sepsis. (6) Though I am not aware that any case has been recorded, I think it more than probable that death might be produced by peritonitis set up by perforation of the uterine wall by the advancing tumour. The great thinning of the uterine wall which has sometimes been described, lends support to this idea.

Diagnosis.—The diagnosis of the disease is a matter of singular difficulty. Were it easy, there is no doubt that many more cases would have been described. When the disease is well advanced, the profound falling off in the patient's condition thrusts obtrusively before us the fact that the woman is in the grip of a *malignant* disease. But in many instances one gets no further than that—it is a sarcoma or a carcinoma, or, may be, a malignant adenoma! Syncytioma malignum would probably be the last thing thought of.

In establishing a diagnosis, there are several salient points of which we should never lose sight. These are—(1) the age of the patient, who is usually in the prime of her reproductive epoch; (2) the fact that at some recent date she has been confined, or has aborted, or has expelled a hydatid mole; (3) the hæmorrhagic character of the disease; (4) the rapidity with which secondary growths arise, and that especially along the circulatory channels.

With a careful attention to these particulars, and the general condition of the patient, one will readily see that he is dealing with a malignant disease, and have reasonable grounds for assum-

ing that it is a syncytioma malignum. But that is a point on which only a histological examination can inform us with certainty.

It is extremely likely that in the early days the symptoms will be ascribed to a fragment of retained placenta, and for its removal the curette may be used. Singularly, after curetting, the hæmorrhages from the tumour are often arrested for a time, and one may be misled into the belief that the curette has removed the *causa peccans*. But it is a fond delusion, as the subsequent history of the case shows. To obviate the possibility of such a disastrous result (for we are dealing with a disease in the discovery of which time means hope of life), it would be well were it made a routine practice in all cases of repeated intermittent uterine hæmorrhage in women, who have been recently confined, to make a digital exploration of the uterine cavity. With antiseptic precautions this can be done with practically no danger to the patient; and the finger will give one a far better idea of the precise condition *in utero* than the most skilfully handled curette in the hands of the most expert observer. Earlier diagnosis of the existence of a uterine tumour would be the rule did the intelligent finger more often take the place of the curette.

Where pulmonary metastases develop early, there is a possibility that the symptoms they produce may be referred to a tuberculous condition of the lungs, and the wretched state of the patient may be attributed entirely to that malady. This suspicion arose in a case recorded by Pfeiffer (¹⁷). But though the physical signs in the chest—the cough and the sputum produced by the secondary growths—may simulate phthisis pulmonalis very closely, repeated microscopical examinations of the expectorations should show the absence of the tubercle bacillus, and so enable us to exclude that disease.

Treatment.—The treatment is a matter of first importance, although, unless the tumour is diagnosed very early, there is little hope of saving the patient's life. To prophylaxis we should pay peculiar attention. At the time of labour we should take great care that the whole uterine contents are expelled, and that there is no fragment of ovum or envelope left behind. Every woman from whom a hydatid mole is removed should be carefully watched for at least a year after the event. This holds good particularly in the case of women between the ages of 20 and 30 years; for we have shown that it is between these ages that hydatid mole most often brings the malignant tumour in its train.

Indeed, it might almost be made a routine practice to curette the uterus several times, at intervals of a month, in all women who have given birth to a hydatid mole. Continued bleedings, recurring at uncertain intervals after the termination of a gestation, should always be regarded with grave suspicion; and the uterus should be explored with the finger, or it should be curetted and

the curetted mass subjected to a careful histological examination.

Once the diagnosis is established, radical treatment should be undertaken immediately. To this there is only one serious contra-indication—the presence of inaccessible or irremovable metastases. Cough, even where it is believed to be due to a secondary deposit in the lungs, should not be regarded as an absolute contra-indication, for, as already pointed out, it may simply be a reflex phenomenon, and Gottschalk's patient lost her cough as soon as the uterus was removed (²).

The treatment to be adopted in all cases where it is not contra-indicated, is immediate extirpation of the uterus. If the adnexa are involved, or are suspected of being so, they should be removed at the same time. The best route for the operation is probably the vaginal one, and as the uterus is usually freely movable, vaginal hysterectomy should not present any special difficulties. In cases where radical operation is contra-indicated, the hæmorrhagic symptoms may be somewhat relieved by an application of the curette. The malodorous discharge may also be corrected by the use of vaginal tampons dipped in equal parts of charcoal powder and iodoform—a mixture much employed in cases of cervical carcinoma by Wertheim of Vienna.

Unfortunately, even after a radical operation, one cannot lay before the patient a very bright prognosis. Unsuspected secondary growths are so apt to waken into activity in various organs, that the hope of continued freedom from the disease is a slender one. I have already shown that the extra measure of life granted to patients who have undergone radical operations is reckoned in most cases not by years but by months. Possibly, when we are able to diagnose the disease at a very early stage, we may be able to offer the sufferers a better prospect. In the meantime the prognosis is always one of extreme gravity.

We now proceed to consider the pathological appearance of the tumour proper, and the metastases. In the ordinary course we should have described these before sketching the clinical features of the disease; but as the pathological appearances are very closely bound up with the discussion which follows as to the precise nature of the disease, we have felt compelled to delay their description till now.

As a rule the uterus is enlarged in every direction, and is of softer consistence than normal. No projections are seen on its peritoneal surface. On opening it longitudinally, one sees one or more tumours of varying size—which may be as small as a pea, or as large as an apple—projecting into its cavity. In some cases where the tumour is entirely intramural and covered by intact mucosa, there is no projection into the uterine cavity. The usual situation of the tumour is the placental site, on which it sits with a broad base, though cases have been recorded where the tumour

was pediculated,—the pedicle being largely composed of uterine muscle. If the immediate precursor of the tumour has been a hydatid mole, the neoplasm may occupy a position anywhere on the uterine wall.

In some cases the tumours are covered by mucous membrane; but in most the mucosa is ulcerated and broken down. The growths vary in colour from a mottled red to a dark purple. Their surface is usually uneven, and covered more or less thickly with a layer of blood clot. As a rule the surface is necrotic and extremely friable. The body of the tumour is spongy and soft, and has apparently been the site of hæmorrhages more or less recent. In some cases the surface of the tumour is papillated, and may present quite a cauliflower appearance. In others, it is a single undivided mass.

In most cases the base of the tumour is deeply embedded in the uterine wall. In others it sends finger-like processes into it, and in these cases, if the tumour could be removed, leaving the invaded uterine muscle tissue behind, the uterine wall would look quite like a sponge. In others again it is situated very superficially, and in one of Gebhard's cases the tumour did not penetrate into the uterine wall at any point, but seemed to be sitting broad-based on the remains of a submucous myoma.

The uterine mucosa may completely cover the tumour, as in Sânger's first case; or it may straggle over it irregularly and incompletely; or it may end sharply in a slight thickening close to the tumour margin. The mucosa covering the surface of these parts of the uterine wall unaffected by the tumour is somewhat thickened, but as a rule quite smooth. The uterine muscle is, except where it is invaded by the tumour, thicker than normal; but it is softer, and of a pale colour, which suggests fatty degeneration.

Macroscopic appearances.—The curette will bring away fragments of sound mucosa, clots of blood, and necrosed tissue, with tumour debris, and perhaps, if hydatid mole has preceded the neoplasm, structures recognisable as villi. The whole presents an appearance which closely corresponds with the tissues removed by the curette in an ordinary case of retained placenta.

The naked-eye appearances of the metastatic growths.—These are naturally influenced to some degree by the nature of the tissue in which they occur. In the lungs the metastases are usually seen as multiple small circumscribed tumours of a greyish red colour. They are distributed through the substance of the lung, or may be situated on its surface. Sometimes one can distinctly see, even with the unaided eye, that the metastasis is situated in a blood vessel.

In the vagina the metastases may be seen as single or multiple nodes situated anywhere from introitus to fornices, and varying in size from a pea to a walnut.

They may be so numerous and of such dimensions as to narrow

materially the vaginal lumen. In colour they are bluish red. The mucous membrane over them may be intact, or ulcerated and broken down. To the touch they are soft, and may sometimes be shelled out with comparative ease.

In the spleen, liver, and other organs, the metastases do not appear to differ in outward appearance from the secondary growths of other malignant tumours in these situations, except that they are invariably soft and very hæmorrhagic-looking. But lymphatic glands affected secondarily are hard.

Microscopical appearances of the tumour proper (see Plate XIII. Figs. 1 and 2).—Sections of the tumour examined under a low-power lens show clumps of spindle-shaped, round, or polygonal cells, some of which are large enough to be classed as giant cells. Between the cells there is no proper stroma, nor do they at any point appear to be welded into cell nests as in a carcinoma. Here and there one finds very irregular protoplasmic masses, containing several nuclei. These irregular strands of protoplasm suggest by their appearance that they are made up by the confluence of several cells whose cell margins have disappeared. In cases which follow hydatid mole, one may be fortunate enough to see among the tumour cells a chorionic villus whose epithelium is in a state of great proliferation. The tumour cells are found lying between the uterine muscle fibres, or eating their way into them. Around the clumps of tumour cells there is a well-marked small-cell infiltration.

According to Gebhard, there are no blood vessels present among the cells; but Nové-Josserand and Lacroix (¹⁹) in their admirable article figure an artery whose walls are being broken down and replaced by the advancing tumour cells.

By using a lens of higher power, one is able to differentiate with greater distinctness the various cells that go to form the tumour. In some of the tumours, *e.g.* that described by Freund (¹⁸), only one variety of cell, and that the greatly proliferated multinuclear protoplasmic aggregation known as syncytium, is found.

In most cases there are at least two varieties of cells, namely, cells which bear a resemblance more or less close to ordinary carcinomatous or sarcomatous cells, and also the multinuclear plasmodia called syncytial cells. Both of the varieties of cells are well seen in Plate XIII., Fig. 2. Then, in a few infrequent cases, we find over and above these cells whole villi which resemble either placental villi or the villi from a hydatid mole.

The syncytial cells.—These are protoplasmic aggregations of varying shape; they are multinuclear, and may appear as a huge mass of protoplasm, containing a clump of nuclei which are specially rich in chromatin, and therefore stain deeply, or as ribbon-like strands of protoplasm with a series of nuclei. Where the ribbon is a very narrow one, the nuclei are met with as little elongated bodies. Between the multiple nuclei distinct cell

margins are at no place visible. The borders of these syncytial cells are devoid of sharp corners. They are usually gently sinuous, and on their margins one may see little thickenings or sprouts, very like the buds of the yeast fungus. These "buds" may assume the form of branches of very considerable size. The protoplasm of syncytial cells is opaque, and does not stain well. An oil-immersion lens shows that the opacity depends largely on the fact that the protoplasm is very granular.

Vacuoles of different sizes are frequently seen in these protoplasmic masses, and these vacuoles may be quite empty, or contain other cells from the tumour or leucocytes or red blood corpuscles. In one cell there may be several vacuoles. The syncytial cells may be met with singly, or two may be arranged parallel to each other, and separated only by a few of the other tumour cells. Or the syncytial cells may surround a clump of the other tumour cells, or, where they come into relationship with muscle fibres, or other cells, their shape may be altered accordingly. Where an hydatid villus is enclosed in the tumour, the syncytial cells may be seen to be budding off from it, as in a case of Gebhard's. Where the syncytial cells come into contact with blood vessels, they evince a marked tendency to break through the vessel wall, leaving nothing of the original wall but the endothelium. They sometimes penetrate into the lumen of the vessel, and, according to Veit⁽¹⁹⁾, do not produce a coagulation as other foreign bodies would. The syncytial nuclei are usually irregular in shape; the shape varying so as to conform with the necessities of its surroundings. Thus, in the protoplasmic ribbons of syncytium, the nuclei are elongated.

As already mentioned, the nuclei are deeply colourable. Their size varies inside very considerable limits, their diameters measuring from 12 to 30 μ (Plate XIV. Fig. 3).

The second kind of tumour cells—Langhans' cells.—In far greater profusion than the syncytial cells, we find, in sections of the tumour, masses of peculiar cubical epithelium with elongated nuclei. These cells, which were at first thought to be decidual cells, are, it is now generally agreed, derived from the so-called cell layer of Langhans—a row of cells which sits immediately upon the stroma of the villi of the chorion. They are oblong, elliptical, or round in shape, and are provided with a distinct cell membrane. In size they vary from 20 to 40 μ . As a rule there is very little intercellular substance between them. Their protoplasm is pale and transparent.

Their nuclei vary in shape, in conformity with the shape of the cells. The nuclear membrane is generally crumpled, and there are one or two nucleoli. Very often there are mitotic figures to be seen in the nuclei, and by a special process glycogen has frequently been shown to lie in little vacuoles in the cell-body.

Elements derived from the stroma of the chorionic villi.—There

is no doubt that more or less of the villous stroma may take upon itself a malignant rôle, and be found as a constituent element of the tumour. Of eighty-nine cases which Veit⁽¹⁹⁾ examined, he found mesodermal structures in sixteen.

As the clinical history of the tumour is a hæmorrhagic one, it is natural to expect that in the sections of it one will meet with areas where bleeding has taken place. These areas are common and are easily recognised. But over and above the hæmorrhagic areas one meets with isolated red and white blood corpuscles scattered among the tumour elements. Towards the surface of the tumour necrotic tissue is very commonly met with. At the base of the tumour, where it comes into close relationship with the vessels running in the uterine walls, one may see the cells eating their way through into the lumen. The rapidity with which metastases are formed is thus readily explained. Wherever the tumour cells come into contact with sound tissue, there is seen a well-marked small-cell infiltration. Now and then among the muscle fibres at the base of the tumour one sees syncytial cells, which, in consequence of their proclivity to make their way among the healthy tissues, are called syncytial wandering cells (Plate XIV. Fig. 4).

The metastases.—Microscopical examination of the metastases shows them to be made up of the same cells as the primary tumour. The fact that the site of the secondary growth is the lumen of a blood vessel, is readily apparent.

In lymphatic glands the secondary growths assume an alveolar arrangement.

Which cells preponderate?—Resinelli⁽²⁰⁾ is of opinion that in different cases the two elements participate in different degree—this degree depending on the duration of the antecedent pregnancy, or on the condition in which the retained chorionic villi find themselves. But in the long roll of my cases there were some in which both elements were met with, no matter what form of gestation preceded the development of the tumour, and no matter at what period the gestation ended; while in a case of Fränkel's, preceded by a hydatid mole, only syncytial cells were found, as also happened in a case reported by Williams⁽²¹⁾ developing after a full-time labour.

Having considered the characters of the various cells which constitute the tumour, the question naturally arises, From what physiological tissue elements do the tumour cells spring? As already pointed out, Sängner believed the tumour cells—or at least a majority of them—to be decidual in origin, and on the principle of a *potiori fit denominatio* named the condition deciduoma malignum. Later, the name syncytioma malignum was suggested, in the belief that the cells constituting it were syncytial rather than decidual. Sängner in his subsequent writings on the matter suggested the term sarcoma deciduo-cellulare. Many other titles

have been suggested, among them being chorio-epithelioma and carcinoma-serotinale, the designation varying according as the writer thought the epithelium of the chorion or the decidua cells were primarily involved. A permanent and satisfactory name for the neoplasm will only be found when the structures first affected have been definitely settled. The preponderance of present opinion leans towards the idea that the chorionic epithelium is primarily involved—the decidua serotina being only affected secondarily. It is of prime importance to know the histogenesis of the elements involved—are they foetal, or are they maternal derivatives? This is a question over which a very spirited warfare has been waged by German authorities, and it cannot yet be said that the matter is definitely settled.

Sir Wm. Turner holds that the syncytium is derived from the endothelium of normal capillaries, and Pfannenstiel ⁽²²⁾, Waldeyer ⁽²³⁾, and Freund ⁽²⁴⁾ agree with this opinion. Heuvelom ⁽²⁵⁾ was not able to observe in any case its origin from the endothelium of blood vessels, and does not believe that maternal elements enter into its composition. Kossmann ⁽²⁶⁾ seeks to prove, on the other hand, that it is derived from maternal tissue, and Selenka ⁽²⁷⁾ is also of this opinion. Hofmeier ⁽²⁸⁾, whose researches into the anatomy and development of the human placenta are particularly luminous, believes that the uterine epithelium becomes changed into syncytium, but this syncytium does not constitute the syncytial mantle of the chorionic villi. It covers the surface of the decidua. The syncytium which clothes the villi of the chorion, he thinks is derived from the cells of the *tunica granulosa* of the ovum. Ulesco-Stroganowa ⁽²⁹⁾ believes that it is derived from the cell layer of Langhans; and others still think it may be a connective tissue derivative. Amid such a discord of opinion my personal view would count for nothing.

Concerning the origin of the cell layer of Langhans, there is not nearly so much discussion, and a consensus of opinion affirms it to be of foetal origin, its source being the stroma of the chorionic villi.

We are thus brought face to face with a series of singular contingencies:—(1) If the syncytium is foetal and the layer of Langhans also foetal in origin, and if they are the elements primarily involved, then we have to do with a tumour arising from foetal elements, and invading in a malignant fashion the maternal organism—a form of parasitism unknown hitherto in the vegetable or animal kingdom. (2) If the syncytium is maternal, and the layer of Langhans foetal, then we have to do with a tumour of mixed origin—partly foetal, partly maternal—menacing the maternal life. (3) If the layer of Langhans is of connective tissue origin, and the syncytial layer of epithelial origin, or *vice versâ*, we have to deal with a tumour of mixed character, a carcino-sarcoma.



FIG. 1.—Low-power micro-photograph of section of syncytioma malignum.

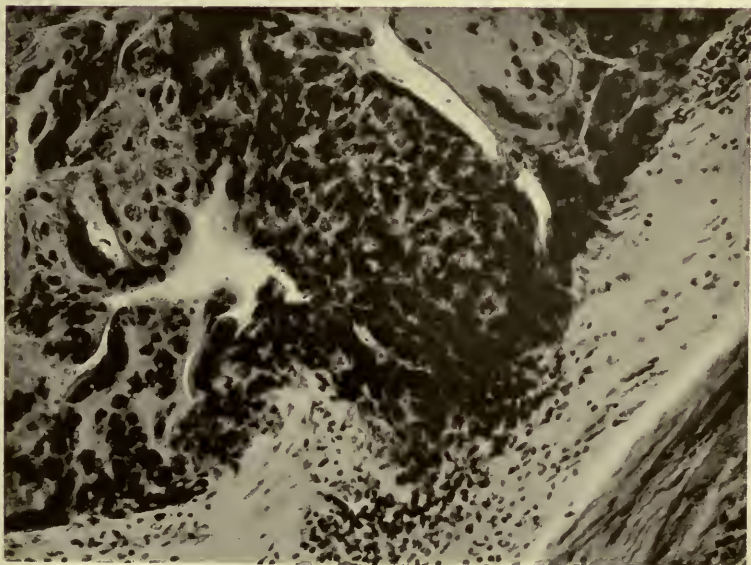


FIG. 2.—High-power photograph of syncytioma malignum. Note the small cell infiltration of the muscle.

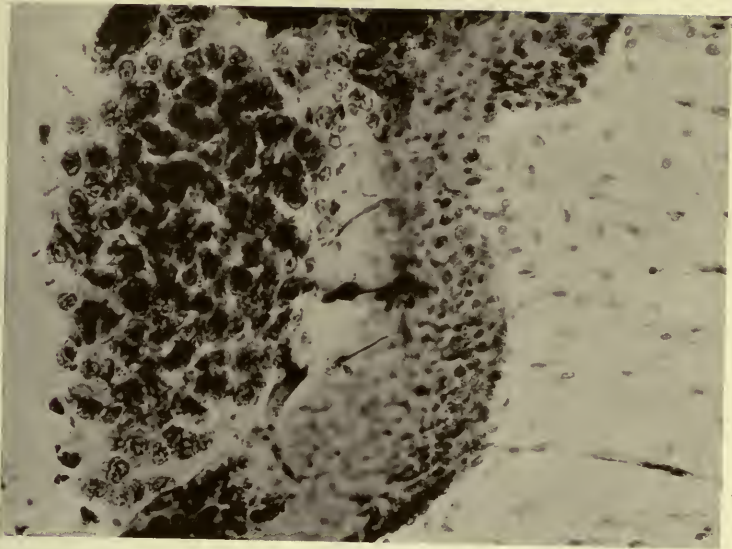


FIG. 3.—High-power micro-photograph of section of hydatid mole ; showing the great proliferation of the epithelium covering a villus.

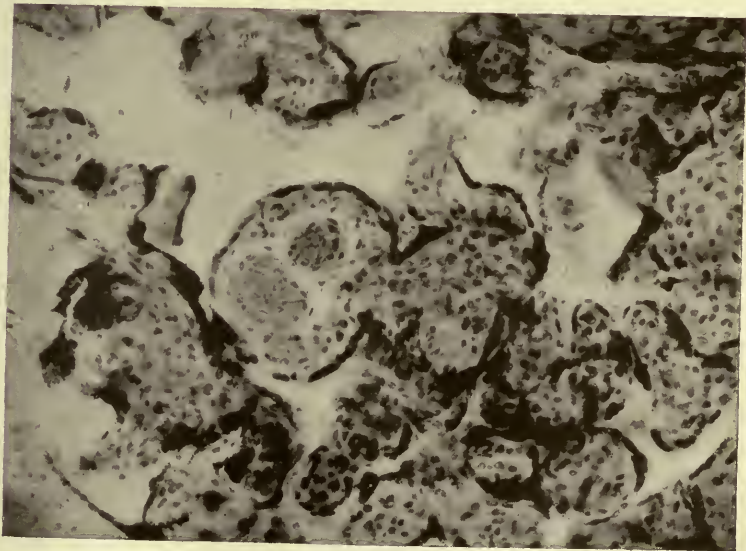


FIG. 4.—High-power micro-photograph of a section of human placenta. It shows, at upper part, destruction of chorionic epithelium by decidual cells.

Many people, and especially the authorities in this country, incline to the belief that syncytioma malignum is simply an ordinary malignant tumour of the uterus, existing before or developing during the course of pregnancy, and undergoing certain changes consequent on the action of the "genetic influence."

When considering this matter, the question necessarily arises, "Can a woman with a tumour of the body of the uterus conceive?" One's experience of uterine fibroids persuades one of such a possibility, and Veit and Emanuel have proved conclusively that a woman with a diseased endometrium may conceive. Olshausen⁽³⁰⁾ goes further than this, and says that even a uterine mucosa affected by malignant disease may become the nidus of a fertilised ovum. This being so, it becomes one to consider what arguments may be advanced for and against the theory.

Against the theory that syncytioma malignum is an ordinary malignant tumour of the uterus, with pregnancy for a complication, we have—(1) The age of the patients, which we have already shown differs materially from the average age of patients suffering from sarcoma or carcinoma of the corpus uteri. (2) The fact that so many cases follow full-time labour; for if the uterus was affected by a malignant growth before gestation began, or if the malignant disease primarily affecting the uterine mucosa developed during the course of pregnancy, it is highly improbable that so many would accomplish an uninterrupted gestation. (3) The character of the cells, and especially the syncytial cells, which may show vacuole formation and fatty degeneration (Schmorl⁽³¹⁾), conditions not found in the ordinary sarcomatous cells. (4) The fact that syncytioma malignum is a large-celled tumour, and kills rapidly. As a rule it is the small-celled sarcoma that is most malignant. No ordinary giant-celled sarcoma kills so quickly as syncytioma malignum. (5) The rarity with which giant cells are found in ordinary malignant tumours of the uterus. (6) The fact that no tumour with the characters of a syncytioma malignum has been met with in a nullipara.

In favour of the theory are the following facts:—(1) Carcinoma and sarcoma of the corpus uteri have been met with at the elective age of syncytioma malignum. (2) The fact that so many of the cases follow abortions, or hydatid mole. This shows that for some reason the uterus is not able to carry its contents, or to allow the ovum to develop in a normal way, and a pre-existing malignant condition of the uterus offers a feasible explanation of these aberrations. (3) Though rare, giant-celled sarcoma of the uterus may occur. "Williams found giant cells in three cases, Pestalozza in two, Terrillon in four, Hegar, Seegar, Katz, Ahlfeld, Rheinstein, Colemann, Riederer, v. Kahlden, Vogler, F. Weber, Pick, and Marpurgo in one each." (W. Beckmann⁽³²⁾); and Fothergill⁽³³⁾ also found in tissue, removed from the womb of a patient past the climacteric, giant cells of round or oval shape embedded in a

small-celled sarcomatous stroma. (4) Any argument for the separate entity of syncytioma malignum, and for the establishment of an inseparable connection between it and pregnancy, based on the character of the cells, is considerably shaken by the fact that both syncytial and decidual cells may be met with apart from pregnancy. Florenzo d'Erchia (³⁴) reports having seen carcinomatous cells assuming the appearance of syncytial elements in a woman of 38, who was married but nulliparous. Gebhard (³⁵), too, has observed a similar phenomenon, and Ferrari (³⁶) observed multinuclear cells lying between the muscle bundles in the uterus of a rabbit, irritated by the introduction of foreign bodies into a uterine horn.

That decidual cells may occur apart from pregnancy has been proved experimentally, and from pathological specimens.

Ruge (³⁷) has pointed out that decidual cells may appear in endometritis; and Bulius found cells which he regarded as decidual ones, deeply embedded in the uterine musculature at the placental site, in a woman suffering from carcinoma of the cervix uteri. Further, Overlach (³⁸) observed in the uterine mucosa of a non-pregnant woman, who succumbed to acute phosphorus poisoning, cells which had all the appearance of true decidual cells; and Calderini (³⁹) experimentally produced a decidual change in the uterine mucosa of rabbits, by injecting into one horn of the animal's uterus a few drops of sterilised paraffin. We therefore see that other things besides pregnancy may produce syncytial or decidual cells, and it is not improbable that, during the reproductive era of a woman's life, the uterine mucosa is so prone to decidual reaction that irritation of any sort, continued long enough, will produce in it that form of cell usually associated with pregnancy. A sarcoma or a carcinoma, therefore, developing in the uterus of a woman capable of motherhood, or at least pregnancy, may set up of itself exactly such changes as would have been brought about by the genetic influence. Therefore we are brought face to face with the possibility that the peculiar cells in the tumour are not due to a pregnancy, but to the effect of the irritation of the developing tumour on mucosa capable of the decidual reaction.

And out of this grows a very potent argument for the proof that syncytioma malignum is a separate tumour, and not merely a malignant uterine degeneration complicated by pregnancy. For if a sarcoma or carcinoma developing in the uterus during the years of the reproductive cycle can, in virtue of the false "genetic influence" it sets up, produce decidual or syncytial cells, why do we not meet with such cells regularly in all cases of malignant tumour of the uterus (even in nulliparæ) between the ages of 15 and 45 years, and why also do we sometimes meet with malignant tumours of the uterus complicated by pregnancy, but yet showing in their tissue no syncytial or decidual cells?

Syncytioma malignum and hydatid mole.—The relation of the tumour to hydatid mole is of great interest. As we have shown, a large majority of the cases followed this form of chronic degeneration. A very brief résumé of some facts relating to hydatid mole will aid our further consideration of the matter.

Hydatid mole, or vesicular degeneration of the villi of the chorion, is a disease of the ovum, and more particularly of the chorionic villi. One finds the whole surface of the chorion, or only some regions of it, covered by a series of vesicular structures of varying size. Virchow⁽⁴⁰⁾ believed it to be a true myxoma of the connective tissue of the villi of the chorion, but the studies of Marchand⁽⁴¹⁾ have materially altered the general opinion as to the true nature of the degeneration.

He found that accompanying hydatid mole there is an increase in the number of the syncytial cells, proliferation of Langhans' cells, fluid in the chorionic villi which does not contain mucin, and a small-celled infiltration of the decidua serotina. The swelling up of the chorionic villi he regarded not as a myxomatous degeneration of their connective tissue stroma, but as a dropsical condition produced mechanically.

The epithelium covering the swollen villi is subject to marked proliferative changes (see Plate XIII., Fig. 3). The syncytium may be greatly increased and permeated by vacuoles, while the cellular layer of Langhans may proliferate and break through the investing layer of syncytium. Such proliferative changes are, according to Fränkel⁽⁴²⁾, very common in vesicular mole.

The degenerated chorionic villi may eat their way through the protecting fibrin layer of Nitabuch, through the decidua serotina, and deeply into the uterine musculature, invading and penetrating in their advance the walls of the uterine vessels.

We have already seen that the cells of syncytioma malignum closely resemble the proliferated covering of the hydatid mole; and this, linked with the fact that hydatid mole is so frequent a precursor of the disease, has led Neumann^(43 and 44) to the belief that, from an examination of a hydatid mole, one is able to predict whether or not syncytioma malignum will develop in its train. He holds that if in the stroma of the villi of hydatid mole one sees large cellular elements of oval shape (syncytial wandering cells), one has at hand a strong indication for the removal of the uterus in which the mole developed. But his conclusions are much weakened by the fact that L. Pick has seen these cells in a case which was not followed by the development of any tumour.

It is a well-known fact that the villi of a hydatid mole penetrate more deeply into the decidua than do the ordinary placental villi. Mere depth of penetration, however, does not constitute malignancy, but the deeper the penetration the more likely is it there will be a retention of some of the parts of the mole. But even retention of foreign elements does not mean

malignancy, unless these elements undergo a malignant proliferation. Gaylord⁽⁴⁵⁾ showed, by injecting small fragments of normal placenta into the circulation of rabbits, that normal placental cells will not proliferate in foreign tissue when separated from their base. Whether, on the other hand, the cells covering the villi of a hydatid mole would proliferate under the same circumstances, is not known; but there is not much reason to think so, for it must be a rare thing for a hydatid mole to be expelled without a few cells from its surface being left embedded in the uterine tissue, and yet there are many cases of vesicular degeneration of the villi of the chorion not followed by any malignant manifestations.

Those who believe that syncytioma malignum is merely a malignant neoplasm complicated by pregnancy, support their opinion by reference to hydatid mole. They say the uterus is primarily diseased, an ovum nests in it, and the ovum is influenced in its development by the disease of the mother; while, on the other hand, the maternal disease is affected by the ovum. The structural changes in the uterine mucosa interfere with the proper circulation in the ovum, and, according to Veit, the chorionic villi may thus become œdematous, and so a hydatid mole is produced. Then the presence of the actively growing products of conception in the womb may waken up the maternal disease into tremendous activity, and bestow upon it also appearances characteristic of pregnancy.

Looking at the matter comprehensively, it seems to me that the weight of argument is in favour of the idea that syncytioma malignum is primarily a malignant degeneration of the epithelium covering the villi of the chorion.

Etiology.—The question naturally arises, why do the investing cells of the chorionic villi take upon themselves powers of malignant proliferation and of invasion into the maternal organism.

It has been suggested that the invasion is due to the breaking down of Nitabuch's fibrin layer—a layer of fibrin found covering the surface of the decidua serotina, or embedded in its superficial zone—by the cells covering the chorionic villi. But to hold this opinion is to invest a sign of the disease with the dignity of a cause. The breaking-down of the fibrin layer is only a proof that invasion is beginning. It cannot be the cause of the invasion.

Fothergill⁽⁴⁶⁾ suggests that in ordinary circumstances the decidual cells act as the maternal first line of defence against the phagocytic action of the chorionic epithelium. In a number of specimens he examined, he found in every case that wherever decidual cells came in contact with foetal epithelium they destroyed it (see Plate XIII., Fig. 4). He therefore suggests, though he does not personally believe in the foetal origin of syncytioma malignum, that "failure of the decidual cells in the performance

of their phagocytic function might be supposed to permit the entrance of foetal cells into parts of the maternal organism where they could multiply into a new growth of foreign origin."

Sänger has suggested that syncytioma malignum may have an infectious character, basing his opinion on a comparison between mycosis fungoides of the skin and the tumour. But in this opinion he has found little support.

In the present-day anxiety to find a bacterial origin for every disease, it is natural to expect that a micro-organism should have the onus laid upon it, but, so far, I have not been able to find in the literature any description of the bacillus of syncytioma malignum—nor any mention of "cancer bodies" having been found among the cells.

It must be admitted that as yet no satisfactory theory has been thrown out to explain why the epithelium covering the villi of the chorion should undergo malignant proliferations. My personal opinion is, that some poison or toxine is introduced into the ovum, or develops in the maternal system during gestation, which determines by its irritative character malignant degenerations of the chorionic epithelium. This poison may be the prime cause of hydatid mole; or, when present in larger quantity, or when exerting its influence over a longer period, may cause the cells of the degenerated villi, left behind in the uterine wall, to assume a malignant rôle.

In cases of syncytioma malignum where abortion precedes the development of the neoplasm, we may explain the abortion as the result of the accumulation of the toxine in the blood (cf. abortions during influenza, pneumonia, and other bacillary diseases), and the subsequent development of the malignant tumour as the result of the continued influence of the toxine on retained chorionic epithelium.

It is a well-known fact that syphilis is a frequent precursor of hydatid mole; and since hydatid mole is so often followed by syncytioma malignum, it may naturally be suggested that the syphilitic poison may have some power of producing malignant degeneration of the epithelium of the villi. That syphilitic poison can produce a proliferation of decidual cells was long ago shown by Virchow (⁴⁷), and Fränkel (⁴⁸), whose researches on syphilis of the placenta have been most thorough, says that if we have to do with syphilis of the father which has left its mark on the ovum, we must expect to find that it has exercised most of its influence on the chorionic villi.

I do not for one moment wish to insist that syphilitic poison is the only toxine which will bring about a malignant proliferation of the chorionic epithelium. To do so would be foolishness, for though there are some cases of syncytioma malignum reported in which there are undoubted proofs of pre-existing syphilis, and others in which there was room for grave suspicion of the pre-

existence of that disease, there are others again where lues venerea could be excluded with absolute certainty.

It is known that decidual cells may proliferate greatly under the influence of the eclamptic poison, and it is not improbable that the same poison may cause a malignant proliferation of the villous investment. In at least two of the cases I have collected the malignant tumour was accompanied by nephritis, which may be taken as a presumptive sign that some irritative toxine was present in the blood.

Berry Hart⁽⁴⁹⁾ has sought to prove that hydatid mole is due to foetal athyria. Athyria necessarily means an abnormal condition of the blood which might possibly, besides producing the mole, invest the cells covering the villi with such abnormal proclivities that after the expulsion of the mole they may continue to develop in a malignant fashion.

The epithelium of the chorionic villi is actively engaged in metabolism, and, being a foetal tissue, it has, like other embryonic tissues, a great capacity for proliferation. The epithelial cells, in the course of the metabolic processes which they carry on, have to take into themselves a large amount of nutrient material. So long as they can hand on this material into the foetal circulation, they do not proliferate, but should any cause arise to irritate the cells, they devote much of the nutrient material passing through them to their own nourishment, and proliferate in virtue of the increased bioplastic energy awakened within them by the toxine.

The cells may be gifted with powers of malignant proliferation by the toxine, and may remain latent in the uterus until some influence may stir them into activity to manifest their acquired characters.

That there are toxines circulating in the blood of all pregnant women is a well-known fact, and that certain conditions may increase the toxicity of the blood serum is also recognised (Ludwig and Savor⁵⁰). Whether the chemical characters of these toxines are constant in normal pregnancies, is unknown, but it is to be expected that they will vary within certain limits. Thus we may have a variation in one direction reaching pathological dimensions, and giving rise to eclampsia; and in another direction, producing a malignant proliferation of the epithelium of the chorion.

That the formation of the particular toxine endowed with the property of stimulating epithelial proliferation is not a constant phenomenon of pregnancy, the rarity of the neoplasm shows. But in the cases in which it does occur its action may be intensified by certain accidental occurrences, such as the death of the foetus. The foetal circulation will then cease, but the epithelium of the villi, in virtue of its great power of taking up nourishment, may continue to live actively; and as it is now under abnormal con-

ditions, a smaller amount of toxine may dispose it to assume powers of malignant proliferation and invasion.

That toxines may cause cells to assume wandering powers, we have a daily proof in the case of an abscess. The growth of the organisms in the abscess gives rise to a toxine which exercises such an effect on the leucocytes in the adjacent blood vessels, that they take upon themselves the power of migrating, and, penetrating the vessel walls, invade the surrounding tissue to ward off the attack of the organisms. Surely such embryonic tissue as the epithelium of the chorion may as easily be influenced by toxines as the leucocytes are.

From all we have written we draw the following conclusions:—

1. Syncytioma malignum is a malignant degeneration of the cells investing the villi of the chorion. The involvement of the decidua serotina is a secondary feature.

2. There is great danger attendant upon the retention *in utero* of placental remnants, or fragments of hydatid mole; and in all cases of hydatid mole, abortion, or full-time labour, it is of the highest importance to make sure that no remnants of foetal tissue are left behind *in utero*. In the event of any repeated bleedings following the termination of gestation, the uterus should be explored and curetted, and the tissues removed examined microscopically.

3. The uterus and adnexa should be extirpated immediately on the discovery of any certain signs of the disease, unless extirpation is strongly contra-indicated. The treatment is pithily summed up in the words—“*Diagnostic précoce intervention radicale.*”

4. The cause of the malignant changes in the cells is the presence in the blood of an irritative toxine of unknown composition.

Addendum.—Since writing the above paper, I have read Haultain's (⁵¹) admirable article, in which he proves, to my mind conclusively, that the tumour cells are only active in a fluid blood medium. This is a presumptive proof of my theory, that the malignancy of the cells depends upon the presence of an irritative toxine in the blood.

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MEDICINE AND SURGERY IN THE ARCTIC CIRCLE.

By JAMES LAING, M.B.Edin., *late House Surgeon, Royal Infirmary, Edinburgh, and at Dawson City.*

ALTHOUGH there are no diseases peculiar to the Arctic Circle, scurvy, snow-blindness, snow-shoe sickness, and frostbite are usually associated with Arctic exploration and hunting expeditions. Among the men who wintered within the Arctic Circle during 1898-99, passing over that part of the Edmonton trail to the Klondyke, there were a considerable number of cases of scurvy. On the Rat River—a tributary of the Mackenzie—out of a camp of 110 men there were twenty-two cases of scurvy, with six deaths. While out of twenty-six men on the lower Peel River we only had one case. The conditions as to fresh meat and food generally being the same, I can only attribute our immunity to a more active life and greater attention to details in cooking, along with considerable consumption of “spruce beer.” On inquiring into the cases of scurvy on the Rat River, it was found that during the dark months of December and January the men affected took little or no exercise, and seldom moved out of their cabins. Also their food, principally consisting of bacon and beans, had been imperfectly cooked, and, to a greater extent, the precaution of cleaning cooking utensils and plates had been neglected. In all cases there was a great tendency to cardiac failure, and the symptoms followed the usual course, *i.e.* “black-leg,” spongy gums, constipation, cardiac weakness. The treatment was of the usual form, and, in addition to medicinal treatment, there was nothing better than raw potatoes, which in a few cases were available, and, failing this, evaporated sliced potatoes, spruce tea—the decoction of young spruce tops and hot water—gave excellent results; or the more palatable form of spruce beer—a compound of spruce tops, yeast, flour, sugar, and water, mixed and allowed to stand in a warm place for a week before use. Lime juice and citric acid were not so satisfactory. Tinned foods, and especially condensed milk, have been advanced as a cause of scurvy, but among the pilgrims there was not enough of the latter, and none of the former, to render it a probable cause.

Snow-shoe sickness (mal de raquette) was more or less common. A tendo-synovitis of the tendo Achillis, and more rarely of the tendons on the front of the leg. Absolute rest, elevation, hot fomentations, and massage were the only remedies of any use, and the condition is apt to be very tedious, laying the patient up for a time varying from a fortnight to three months. The condition may, however, occur without the use of snow-shoes, from long travelling on a hard trail—due to the absence of any form of heel on the moccasin.

Snow-blindness, with rare exceptions, is only seen in the spring when the sun's rays are reflected with great brilliancy from the snow, a simple and efficacious preventive being to tie a coloured handkerchief round the head crossing the nose, thus shielding the eyes from the light on the snow. Snow glasses, of smoked and green glass or of talc, are useful, and for the condition itself, absolute exclusion of light and the application to the eyes of a solution of boric acid and cocaine is usually sufficient. The effects usually pass off in a few days.

Frostbite.—There were many cases of frozen limbs, ears, and noses, mostly superficial, for which the rubbing over with snow was sufficient, but in a few cases amputation of fingers and toes—and in one case amputation above the ankle, was required. For a badly frozen limb the treatment is immersion in cold water, rubbing with snow, and, after the circulation has been restored, wrapping the limb in flannel and elevating. I thought this was generally known, and my excuse for mentioning it is that I saw an American doctor with the soles of his feet badly frozen hold them up against a stove—in spite of repeated warnings—the result being that a great part of the soles of both feet sloughed, confining him to bed for a month, and rendering him lame for some months afterwards.

Wounds.—The healing of wounds among the whites in the far north is unsatisfactory, especially in lacerated wounds caused by the sharp spikes on the pine trees. Clean-cut wounds, such as caused by axe or knife, even under most careful antiseptic treatment, nearly always suppurated. Among the Indians the results are better. I removed a large fatty tumour from the arm of an old Indian woman, closing the wound with sutures of sinew got from the tendons of the foreleg of the cariboo, and healing took place by first intention. There were a few cases of gunshot and bullet wounds, one a compound comminuted fracture of the proximal phalanges of the ring and middle fingers; the bones united early, but the soft parts healed slowly, with webbing of the fingers; this, however, yielded to the usual operation.

Tuberculous disease is prevalent among the Loucheux Indians, and even more so among the half-breeds, the lungs, glands, and in a few cases the testicle being affected. I did not see any tubercle of bones or joints. Epidemics of whooping-cough occur, and are very fatal among the Indian children, and concerning this a curious thing has been observed. Some years ago whooping-cough was prevalent at Winnipeg and some of the Hudson's Bay Company's employees there suffered from it. In July, when the annual supply of trade goods reached Peel River post, and on being opened, several cases of whooping-cough occurred, and shortly after the goods were traded with the Indians an extensive and fatal epidemic of whooping-cough occurred. I understand there was a similar experience at other posts on the Mackenzie River during the same season.

The eating of imperfectly thawed meat on the trail gave rise in some cases to acute gastric pain and great collapse, and in some cases to acute diarrhœa; this yielded quickly to medicinal treatment when available, or, when in the mountains, to copious draughts of hot water and the application of heat to the abdomen. Among the coast Indians and Esquimaux to the east and west of the mouth of the Mackenzie River, venereal disease and syphilis are frequently seen, and among the Esquimaux are greatly aggravated by their filthy habits. During the almost tropical summer from June to August, mosquitoes and small black flies are a perfect scourge, and on several occasions badly poisoned wounds followed their bite, and in one case symptoms of fever of a malarial type. The winter cold being extremely dry, it is the custom to sleep out, while on the trail, round the camp fire, at temperatures from 20° to 50° below zero, without anything overhead, and with only a few pine boughs and a waterproof sheet between one's blankets and the snow. This would appear to be an excellent country for the open air treatment of phthisis.

Medicines should be carried in tabloid form. The advantages are obvious—greater portability, and they are not affected by the temperature, sometimes as low as 70° below zero. Midwifery among the Indians is generally a simple matter. One woman, with a band of Indians on the trail, stopped behind with another woman at the midday camping place; her child was born, and after an hour or two, the two women with the baby walked on eight miles and joined the main camp. Two white women passed over the Edmonton trail in 1898 and 1899, and at Fort Macpherson one of them gave birth to a child, in January 1899, on the coldest night of the year. Her husband asked me to be present, and volunteered the statement that he had borrowed a pair of midwifery forceps from the mission. On arriving at the cabin, I asked to see the forceps, and he handed me a good-sized pair of ice tongs, which, fortunately, were not required. In due course the child was circumcised, and when three months old was taken across the 100 mile portage from the Peel to the Bell River, sleeping out for three nights at a temperature below zero, and reached Dawson in June, after a thousand miles journey through the Arctic over the snow and by open water, before attaining the age of six months. This, and the fact of his being one of the three "farthest north" white children—as far as I can gather—are the only reasons for mentioning his existence. The other two children are Lieut. Peary's child born in Greenland, and the child of the Rev. Mr. Stringer, the missionary at Herschel Island.

A NEW TREATMENT FOR INOPERABLE CANCER OF THE BREAST.

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(PLATES XV.—XVI.)

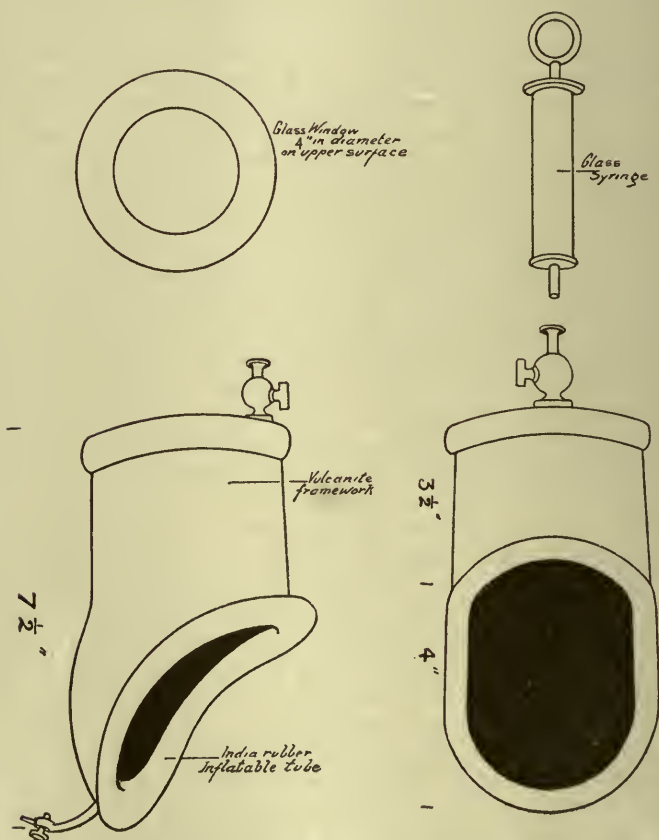
IN this article I wish to draw attention to what is, I believe, a new principle in the treatment of those cases of carcinoma mammae which are unsuitable for operation. It must be confessed that the means hitherto adopted, and the remedies applied, have not had much effect in checking the onward progress of the disease. To this statement, however, an exception should be made for Dr. Beatson's treatment by oöphorectomy and the administration of thyroid extract; but even here it would seem to be the experience of most surgeons, that though the growth may be temporarily arrested, no permanent good is produced, and that after a time all the signs of renewed activity again become apparent. The principle on which my method is based consists in making no attempt at the destruction of the carcinomatous cells, but simply aims at preventing them, or the agent which causes their multiplication, passing along the lymphatics, and invading the internal organs. Before, however, describing the rationale of the treatment, it will be necessary to mention the class of case which is suited for this treatment. It comprises two chief groups. In the first there is, we will imagine, an ulcerating scirrhus adherent to the pectoral muscle; the axillary glands are much enlarged, matted together, and some, perhaps, firmly bound down to the thoracic wall.

The second group includes those cases where, after one or more operations, the growth has "recurred" in the pectoral muscle, in the lymphatic glands, or in both. In both groups, the surgeon, knowing it is impossible to remove all the affected parts, does not recommend any radical operation, and in both it is to be supposed that the growth has not travelled along the mediastinal lymphatics to any extent, and that the internal organs, whether in the thorax or abdomen, are not affected. Now, in such cases, what is the exact position of affairs? It is this—(1) The carcinomatous cells will go on multiplying, and will pass along the lymphatic vessels and lymphatic glands, and eventually invade internal organs; (2) whatever the cause of the excessive multiplication of these cells may be, the fact remains, that all attempts made to destroy them, or prevent their development, have so far proved abortive; (3) whether any particular kind of fluid medium is essential for the development of these cells, is not known. The relation of the "cancer juice" to the cancer cells has never, as far

as I am aware, been accurately determined. Is the juice, for instance, formed after a certain number of new epithelial cells have been produced? that is, an accidental circumstance attending the rapid multiplication of the cells; or is the juice the medium and the only medium in which the cells can develop? The answer to these questions is most important. Admitting for the moment that the cells can only develop in the cancer juice, then it must logically follow that if the juice can be prevented from passing along the lymphatics, the cells, even if they do enter these vessels, must eventually die from lack of nutriment. On the other hand, if the juice is quite immaterial to the development of the cell, and it is the cell itself which causes multiplication of the neighbouring cells, either by its close or immediate contact, or should it be that one of the protozoa manufactures a fluid in which the cancer cell multiplies—the practical conclusion we are bound to come to is this,—that, not knowing how to destroy what for want of a better term may be called the noxious agent or agents, and not even knowing what its nature is, but being aware that epithelial cells and cancer juice are present, and recognising that either or both of these may be the cause for which we are seeking, it becomes our duty to prevent both of these if we can from passing along the lymphatics, by keeping them as near the surface as possible. My principle is, “Prevent dissemination”—if this can be done—and we can thus secure to the patient a longer lease of life, then in a certain number of cases and after a certain lapse of time, as clinical experience often shows, we may expect to find the original growth in the breast atrophy, or at any rate remain stationary. If this should not be the case, however, and the growth should increase in size, it is quite immaterial when compared to the grave risk we run in allowing the noxious agent causing cell multiplication to travel along the lymphatics, without any effort to check it, and thus permitting it to give rise to growths in the internal organs with which it becomes quite hopeless to deal. It is quite clear that if only we can prevent or delay dissemination, then, apart from what may be termed accidental circumstances, namely, hæmorrhage and septic absorption, etc., we shall have overcome what is the chief difficulty in dealing with these cases of carcinoma mammæ. But to return to the means of providing a suitable force which shall counteract the tendency the cells and juice possess to pass inwards along the lymphatics. After a great deal of thought on the subject, it occurred to me that this could best be accomplished by means of suction action. For this purpose I have had constructed by Weiss a large vulcanite shield, which is made to fit accurately on the skin round the scirrhus, or the “recurrent nodules,” as the case may be. As large a surface as possible is included within its area. At the bottom of the shield is fitted a broad india-rubber inflatable tube exactly similar to

that in an ether inhaler; the shield at the surface is provided with a small tap on to which can be adjusted an ordinary air-pump; the whole of the air in the apparatus can thus be thoroughly exhausted. By this means a force is provided which it is hoped will, as long as it is in action, constantly restrain the noxious agent from passing to the deeper lymphatics, and so prevent or delay dissemination. It is most essential that the instrument should fit accurately. By taking a wire and bending it to the exact shape required, an accurate mould of the chest wall can be taken, and the vulcanite rim cut accordingly.

Fig. 1 is a drawing made to scale of the instrument used in Case 3. In Case 2, the instrument, which is not here represented, is



made of copper, but in other essentials it is the same as in Fig. 1. Vulcanite, however, is easier to mould than copper. It is useful to have a glass window let into the top of the shield, as it enables the surgeon to see to what extent the scirrhus is being "drawn." It is clear, for such a force to be really effective in the way I have

indicated, it is necessary for patients to wear the instrument night and day, but though they will not do this, as a rule they will wear it for six or seven hours, and I have one patient who will do so for fifteen hours out of the twenty-four. The suction action with a perfectly fitting instrument will last about half an hour, and, other things being equal, the more capacious the instrument the longer the suction action. As regards the pain, there is very little. If the instrument causes bleeding and brings a good deal of discharge to the surface, in most cases the pain is very materially lessened.

The next point—the importance of which cannot be exaggerated—is insisting on absolute rest for the arm of the affected side. It is well known that all movement very materially quickens the lymph flow. If, then, in the lymph are agents which cause cell multiplication, it is quite clear that these agents must be carried further and further inwards with every single movement. After all operations for scirrhus, even when the operation has been performed for a growth in the earliest possible stage, it is necessary to instruct the patient to keep the arm in a sling and not to use it for at least two years afterwards. For even admitting the surgeon has removed well beyond the affected parts, and of this he can never be morally certain, in spite of every precaution, he may have infected some fresh spot during the operation, and if this prove to be the case, and time only will show it, and in the meanwhile the patient is encouraged to use her arm, the result is that, should the so-called recurrent nodule make its appearance, there is a great risk that instead of being near the surface, as it might have been if the patient had remained quiet, it may be more deeply situated; its removal may be then impossible. I am convinced that the present practice of allowing and even encouraging patients to use their arm as soon as the wound is soundly healed is entirely wrong. Even after the most radical operations, patients should be treated as though all the noxious agents causing cell multiplication had not been got rid of, until such time as this is proved not to be the case.

A remarkable case which bears on this point is recorded.¹ A breast which was affected with scirrhus was removed, with some of the axillary lymphatic glands, from a woman *æt.* 47. Five years and eight months afterwards she had a severe attack of pain in the back and limbs. Nine years and three months after the operation she died of secondary carcinoma of the bones. The ribs were examined microscopically, and the plates show beautifully the absorption of the bones by the cancer cells. As the authors state, the case is remarkable for the long time which elapsed between the operations, and the first evidence of bone infection, namely, five years and eight months. This and similar cases mentioned by the authors only serve to emphasise the importance of the point on which I am now insisting, namely, that even if an operation has

¹ Ritchie and Purves Stewart, *Trans. Med.-Chir. Soc.*, Edinb.

been performed, the surgeon has no right to assume that the noxious agents causing cell multiplication have been removed; on the contrary, he should act as though they had not, and for at least two years after the operation—and in the light of the case mentioned above, the time ought to be prolonged for many years more—he should do his best, by insisting on absolute rest for the arm on the affected side, to prevent dissemination.

At the commencement of this article, I mentioned that a patient with an ulcerated scirrhus would, under the conditions already mentioned, be a suitable case for this mode of treatment. It will be clear at once that if an ulcerated surface is present, there will be no obstacle to the cells and juice which are drawn to the surface being got rid of entirely, and so great an advantage is this, that if ulceration is not already present, I do all I can to encourage it by the constant use of boracic fomentations, which have this additional advantage, that they soften the fibrous tissue which is present, and thus the channels in which the cells and cancer juice travel become less constricted, and the suction action is thus rendered more effective. Except by the use of fomentations, I have not hitherto adopted any other means of causing a breach of surface, but so convinced do I feel of the necessity of drawing the noxious agent or agents to the surface, that I am considering whether it would not be advisable to cause a breach of surface either by multiple punctures or by the scalpel. In making this suggestion, I am aware that one of the great dangers attending any ulcerating malignant growth is sepsis and septic absorption, but my point is, that even if sepsis does take place, with the suction action in force, there is no reason why absorption should take place—in fact, every reason why it should not. The instrument not only checks the absorption of septic products should sepsis occur, but it also affords a comfortable shield to the breast. Against the use of such an instrument it may be urged that the suction action must cause bleeding. It frequently does. This, however, should not be checked, unless dangerously free, for two good reasons. In the first place, after such a flow of blood, the pain is nearly always materially lessened; and, in the second place, in the blood, especially if it is venous, may be the noxious elements we are endeavouring to get rid of.

In giving the notes of the cases in which this treatment has been adopted—if I have so far succeeded in making clear the principle on which the treatment is based, it will be obvious that all the evidence as to its efficacy must necessarily be on the negative rather than on the positive side—there must be evidence to show that since the commencement of the treatment the disease has not spread to any extent along the lymphatics or veins.

The following are the notes of the three cases in which this treatment has been adopted:—

CASE 1.—S. G., æt. 76.—Patient had noticed a small lump immediately above the nipple about February 1900. This increased in size.

She came to the Cancer Hospital, June 7, 1900. On examination, a hardish mass, red and granular, about the size of a shilling, was found immediately above the nipple, which was itself retracted, the outer quadrant of the breast was somewhat thickened, but otherwise felt normal, and no axillary glands were to be felt. As the patient refused operation, suction treatment was commenced on June 7, and continued till October 1. The patient was able to keep the instrument on from eight to fourteen hours out of the twenty-four, and on an average there was about half a drachm of discharge after each eight-hour application; this was sometimes bloody and sometimes quite clear. The shield was worn for nearly four months, and during this time, though the ulcerated surface became slightly more extensive, there was no evidence to show whatever of the glands becoming affected, or of the disease spreading along the lymphatics. The treatment was discontinued as the patient eventually consented to have her breast amputated.

CASE 2.—R. M., æt. 67, received a blow on the right breast about October 1898. Shortly afterwards she noticed a lump, from which, however, she suffered neither pain nor inconvenience. A second time she injured her breast, and then she noticed several lumps, which began to grow and ulcerate. On examination, in October 1900, at the Cancer Hospital, it was found that there was a large ulcer, the edges of which were hard but not everted; there was thickening in the breast above this, especially towards the inner end. Much thickening and matting together of the glands in the axilla, and under the pectoral muscles. The case was evidently one of ulcerating scirrhus, and one unsuited for radical operation. On October 18, the suction shield for which the patient had previously been measured was applied, and the suction action found to be most satisfactory. The patient was able to wear the shield on an average from seven to nine hours out of the twenty-four, and there was a weekly discharge of from 10 to 15 oz. Since the commencement of this treatment, with which the patient still continues, the edges of the ulcerated surface have become harder and more everted, and the area of thickening in the breast itself has undoubtedly increased, but though the area has increased, the actual hardness in the breast itself is often much less marked, and at times feels almost soft—in fact it varies very much. The discharge has become more offensive, and there has been much more sloughing. On the other hand, the axillary thickening is undoubtedly less, and this is proved by the fact that the patient can now raise her arm much higher than she could when she first came to the hospital. Considering how extensive the ulcerated surface is, and how offensive the discharge, it is certainly remarkable how well the patient looks, and I cannot help thinking that up to the present time the suction action has checked the inward extension of the growth, and also prevented the absorption of septic products.

The illustration of this case (Plate XV.) shows well the long ulcerating surface, 6 in. in length, from the inner end of which there is now an immense amount of sloughing, which has very much increased since the instrument has been used. The thickening in the axilla is not represented.

CASE 3.—M. W., æt. 34.—In February 1897 she noticed a lump in her right breast. In November 1898 the breast was amputated at the

Cottage Hospital, Ealing. In 1899, another lump beneath the scar was removed, and since then she has noticed lumps underneath her arm. On admission to the Cancer Hospital, it was found that there were three nodular masses of scirrhus, the innermost, red, round, and somewhat raised, about 1 in. in diameter at the base, was attached firmly to the pectoralis major. The other two nodules were flatter and situated nearer the axilla; of these, the one situated highest and nearest the axilla was felt to be continuous, with a hard mass which extended as far as the posterior fold in a backward direction; this mass was evidently caused by the growth invading and matting together glands, muscle, and fascia. As the nodules were so adherent to the pectoral muscle, and as it was probable that the supraclavicular glands were affected, I did not recommend any radical operation.

On September 5, 1900, the suction instrument was applied and found to fit and "draw" excellently. The patient was able to wear it on an average from four to eight hours out of the twenty-four, and on an average there was and still is from a teaspoonful to two tablespoonfuls of discharge (which is sometimes pure blood) during the week. After the discharge the patient says she always feels much easier. Since the commencement of the treatment the innermost nodule especially, and to a much less extent the other two, have become prominent, and all three seem distinctly less adherent to the pectoral muscle. At the same time, the axillary thickening has not, as far as can be judged by careful examinations, advanced at all. The patient's general health keeps remarkably good, and though on one or two occasions she has had to discontinue the use of the instrument for several hours owing to the pain, she has not otherwise had any real inconvenience from it.

In this case, then, there is no evidence to show the disease has in any way extended inwardly since the treatment commenced, but, as I have mentioned above, sufficient time has not yet elapsed to warrant the statement that the inward extension has been checked by the treatment. In the illustration of this case (Plate XVI.) it will be noticed that the innermost nodule is very prominent; it has evidently become much "drawn" to the surface by the treatment; the thickening in the axilla is not represented; the scars from the previous operation are quite apparent.

The two chief difficulties we have to contend with are—(1) to ensure the force acting over a sufficiently wide area; (2) to provide for its constant action. However, with time, I have little doubt that these difficulties may be entirely overcome. The principle on which the treatment is based is, I feel sure, the right one—the principle which I may repeat once again aims at preventing dissemination, and not in making attempts (by injections or otherwise, all of which have hitherto proved useless) to destroy the epithelial cells. If, without more definite facts, it should be said I have been premature in bringing this treatment to your notice, my excuse is, my anxiety to have the principle tested in as wide and thorough a manner as possible. The photographs and the drawing of the instrument were most kindly made for me by Dr. English, anæsthetist to the Cancer Hospital, to whom I have much pleasure in acknowledging my indebtedness.



The extent of ulcerated surface is well shown. From the inner extremity of this long chasm there is a vast amount of sloughing. The dotted line represents the area enclosed by the apparatus.



The dotted line shows the area enclosed by the suction instrument. The innermost nodule is very prominent.

NOTE ON THE CREMASTERIC REFLEX IN SCIATICA.

By G. A. GIBSON, M.D., D.Sc., F.R.C.P.Ed., *Physician to the Royal Infirmary, Edinburgh.*

A REMARKABLE exaggeration of the cremasteric reflex, in cases of sciatica, has lately forced itself upon my attention. This symptom has shown itself in every instance of the affection that has recently been under my notice. It has been present, not only in the more serious types of disease—attended by wasting of muscles and disturbance of electric reactions—which are certainly of neuritic origin, but also in the less grave varieties—not accompanied by muscular wasting and changes in electric responses—which may possibly be purely neuralgic.

The reflex in these cases can be elicited in the ordinary way by gently stroking the skin on the inner side of the thigh; it is, however, much more easily produced by firm pressure over the lower and inner portion of Scarpa's triangle, whose sensory nerve supply is derived from the internal cutaneous branch of the anterior crural nerve. In cases of unilateral sciatica, pressure in this region on the unaffected side produces the ordinary slight cremasteric contraction, while an equal stimulus applied to a corresponding point of the affected limb gives rise to a greatly exaggerated response on the side of the lesion. In some cases this is followed, slightly later, by a less distinct contraction on the opposite and unaffected side.

It is of great interest to find that this exaggeration of the cremasteric reflex occurs in cases which do not manifest much increase in the knee-jerk, as well as in others with great augmentation of the myotatic irritability. So far as my observations go, it seems to me that the extent of the cremasteric reflex is, as might be expected, greatest when the knee-jerk is much exaggerated, yet the increase of the cremasteric response is more constant than that of the knee-jerk. Whether this cremasteric response bears any relation to the extent of the plantar and gluteal reflexes, is a matter which has also engaged my serious attention. In some instances all three reflexes have been exaggerated almost to the same extent; in others, while the cremasteric response was very strongly in evidence, the plantar and gluteal reflexes were scarcely obtainable. It has never in my experience been associated with the symptom of dorsiflexion of the toes on stimulation of the sole of the foot.

Whether any explanation of the symptom can be discovered, is a point worthy of discussion. The afferent segment of the reflex arc is the internal cutaneous branch of the anterior crural nerve, which arises from the second, third, and fourth lumbar segments of the cord. The efferent tract is the genito-crural nerve, which has its origin in the first and second lumbar segments. The

cremasteric reflex centre is usually held to be situated in the second lumbar segment. The great sciatic nerve has its origin in the lumbo-sacral cord, arising from the fourth and fifth lumbar segments, as well as in the roots of the first, second, and third sacral segments. It therefore follows that there is no direct connection between the great sciatic nerve, on the one hand, and the genito-crural nerve on the other, such as is undoubtedly present in the case of the anterior crural and genito-crural nerves. The conclusion seems therefore to be inevitable, that in sciatica the segments of the cord above the level of the lumbo-sacral cord are in a condition of excessive irritability. It is a matter of real interest in this connection to observe that in sciatica there is an interesting analogy between the superficial reflexes and the tendon responses. It has been stated above, that the plantar and gluteal reflexes are not so constantly exaggerated as the cremasteric. A similar relation obtains between the tendon phenomena of ankle and knee—the ankle-jerk being much less frequently increased than the knee-jerk, while ankle-clonus also is far from common. Now the plantar centre is situated in the second sacral, and the gluteal in the fourth and fifth lumbar, segments, while the cremasteric is in the second lumbar segment; similarly the ankle centre is in the first, second, and third sacral segments, while the knee centre is in the second lumbar region. Anatomically, therefore, the cremasteric centre and the knee centre are situated above the connections of the sciatic nerve; it therefore seems probable that in sciatica the segments of the cord at and below these sciatic connections have but little tendency to exaggeration, while those above are in a condition of exaltation.

STENOSIS OF THE SMALL INTESTINE AFTER STRANGULATED HERNIA.

By ALEXIS THOMSON, M.D., F.R.C.S.Ed., *Assistant Surgeon,
Royal Infirmary, Edinburgh.*

It is remarkable how completely the bowel recovers from the damage sustained in a strangulated hernia. It is almost the invariable experience that, unless gangrene has occurred, the bowel may be returned into the abdomen with every confidence that it will recover. We need not be concerned because of the existence of recent peritonitis, and the presence of lymph on the bowel, as it is quite exceptional for this to result in the formation of adhesions and bands which may cause obstruction by kinking or strangulation. The object of this communication is to direct attention to the mechanical constriction of the bowel in strangulated hernia, apart from its connection with gangrene and perforation.

In operating for strangulated hernia, it is very common to meet

with circular grooving of the bowel at one or both ends of the loop engaged in the hernia. These constrictions, grooves, or furrows may be shallow or deep, may occupy only a segment of the circumference or extend right round the bowel. When the intestine is liberated and handled, the grooves almost invariably recover. They may, however, persist; in this case the symptoms of obstruction continue instead of being relieved by the operation; or, at a later period, they may become the seat of a fibrous stricture; in this case the patient appears to be making a good recovery until the symptoms of obstruction gradually reassert themselves.

1. The stenosis which results from persistence of the constriction grooves is an urgent condition. An apparently successful herniotomy is not followed by relief of the symptoms, the patient continues to vomit, loses strength rapidly, and if left to himself will almost inevitably die. If, however, the belly is opened under these conditions, we find a state of matters which is quite capable of being relieved. The damaged loop of bowel is found in the vicinity of the hernial opening; although two or three days may have elapsed since the herniotomy, the intestine has not altered either in the direction of recovery or of gangrene. It presents the same discoloration and the same constriction grooves as when seen at the first operation. The obstruction resulting from this persistence of the constriction grooves may be rendered more complete by the addition of paresis of the muscular coat of the gut; in our opinion, however, the mechanical constriction is the primary and essential factor.

The microscopical appearances of the bowel at the seat of constriction consist in great engorgement of the vessels and extensive hæmorrhagic and leucocytic infiltration of all the coats, being most pronounced in the mucous membrane; similar changes are present in a minor degree in the majority of cases of strangulated hernia.

The treatment consists either in the immediate resection of the damaged portion of bowel, or in relieving the obstruction by enterotomy and deferring the resection until the associated conditions are likely to favour its successful performance. I am strongly in favour of the latter alternative.

I shall now relate an illustrative case which occurred in my private practice a little more than a year ago.

CASE 1.—The patient was a male child, æt. 2. He was known to be the subject of imperfectly descended testicle and inguinal hernia on both sides. In September 1899 the right hernia became strangulated, but was reduced under chloroform. In February 1900 he was again seized with sudden illness, cried with pain, vomited, and the left hernia was found to be strangulated.

It was impossible to reduce it under chloroform. Dr. Robert Stirling of Perth was called to see the child, and performed herniotomy within six hours of the onset of symptoms. The sac contained a loop of small intestine, shining, quite black, and with a well-marked constriction at

either end of the loop where it had been caught at the internal ring. The bowel was regarded as viable and was returned within the belly. The testicle was left in the inguinal canal. The symptoms of obstruction persisted. Dr. Robert Stirling being unfortunately confined to the house through illness, I was summoned to see the child three days after the herniotomy. I found him exhausted and reduced with the constant vomiting and want of nourishment. The pulse was 120. I believed the obstruction to depend upon some complication related to the recent strangulation, and advised immediate operation. An interesting feature was the entire absence of abdominal distension, doubtless to be attributed to the obstruction being situated very high up in the jejunum; as a matter of fact, it was found within 2 ft. of the duodeno-jejunal junction.

The rectum, being full of fæces, was emptied by means of an enema. Mr. Robert Purves helped me with the operation. The wound was extended upwards so as to open the belly. A loop of bowel, quite black in colour, was at once exposed, showing a deep constriction ring at either end of the loop, as if a string had been tied round it. The enormously distended bowel alone was traced beneath the transverse colon to the duodenal junction; below, it was empty and contracted to the size of an ordinary lead pencil. The mesentery of the damaged portion was also black.

The critical condition of the child did not permit of an immediate enterectomy; the damaged loop and distended portion above were brought out and fixed in the wound, and a Paul's tube was inserted into the distended bowel. Ten days later, the wound was again opened up, and the damaged loop of bowel was removed along with its mesentery. In proceeding to join the ends, it was found that the lower contracted end was only about half the diameter of the upper; it was therefore cut very obliquely, and a longitudinal incision was made on the side opposite the mesenteric attachment; the junction was effected by a double row of sutures. His recovery was delayed by an attack of bronchitis, which led to the formation of a ventral hernia at the upper end of the scar. The hernia was cured with a truss, and the child is now strong and well.

The portion of the bowel removed measured 23 cms.; its proximal end had a diameter of 2 cms., the distal end of 5 mm. Sections were made in the situation of the distal constriction; there was no appearance of necrosis of the mucosa, merely extensive hæmorrhagic and leucocytic infiltration of all the coats and especially of the mucous membrane.

2. The stenosis which depends on the formation of a fibrous stricture is of gradual development, and the associated symptoms do not make their appearance until an interval of weeks has elapsed since the original strangulation. The herniotomy is apparently successful, the vomiting ceases, and the bowels act naturally, or there may be persistent diarrhoea. After an interval, averaging about three to five weeks, but which may extend to several months or years, the patient complains of pain in the belly, especially after solid food, and he occasionally vomits after meals. The symptoms are relieved for a time by laxatives and a restricted fluid diet, but

obstruction gradually develops and becomes more and more decided. Where the stricture is complicated with adhesions and kinking of the bowel, the onset of obstruction is more rapid, and sometimes attains the urgency of the acute variety. The second operation has been performed at periods varying from the sixteenth day to the twelfth week after the original herniotomy. When the abdomen is opened, the damaged loop of intestine is usually found in the vicinity of the previous wound, and is frequently discovered to be fixed in this region by adhesions to the belly wall or to the neighbouring organs. The adhesions having been separated, the affected loop is found to present a fibrous stricture at one or at both ends, in the position of the constriction rings observed at the first operation. The mesentery may be contracted and fibrous. Above the stricture the intestine is greatly distended and its walls hypertrophied, while below it is collapsed and empty. Under these conditions the treatment is directed towards relieving the obstruction and getting rid of the stricture. If there is no great disproportion between the bowel above and below, and the patient's general condition is favourable, the strictured loop may be resected straight away. Personally, I am in favour of relieving the obstruction in the first instance by means of an enterotomy above the proximal stricture, and resecting the bowel at a later period when the distension has been got rid off. Enteroplasty or longitudinal divisions of the stricture, and the exclusion of the strictured loop by making an anastomosis between the bowel above and below, are alternative but less desirable procedures.

The nature of the stricture varies; it may be a mere cicatricial furrowing of the peritoneal coat, an annular or tubular fibrous stricture involving the entire thickness of the bowel, or a septum or diaphragm crossing the bowel and provided with an opening in its centre. Necrosis and shedding of the mucosa is regarded as the most common antecedent of the fibrous stricture.

The following is a characteristic example of stricture of the bowel resulting from strangulated hernia; as it has already been reported elsewhere¹ in full, I shall only recapitulate its more important features.

CASE 2.—In November 1896, I operated upon a man, æt. 31, for congenital inguinal hernia on the left side, which had been strangulated for three days. The sac and its contents—a loop of intestine—presented the usual features of recent peritonitis. Having relieved the tight constriction at the internal ring, the bowel was pulled down, and was found to present two constriction rings, one at either end of the loop, in the position of the internal ring. It was regarded as viable, and returned. The patient's progress was quite satisfactory until the end of the third week, when he began to present symptoms of chronic intestinal obstruction. Laparotomy was recommended, but was not accepted until twelve weeks after the original herniotomy. He was then emaciated to a

¹ *Brit. Med. Journ.*, London, October 9, 1897.

skeleton; the belly was distended with visible coils of small intestine arranged in a ladder pattern, and exhibiting active peristaltic movements attended with loud gurgling noises. He vomited large quantities of foul-smelling, greenish brown fluid every alternate day.

The belly was opened above and to the inner side of the existing scar. The loop of damaged bowel was found close to the inner edge of the wound, being fixed by an adhesion to the anterior abdominal wall. It was liberated and brought outside the wound. There was a well-marked fibrous stricture at either end of the loop. Above the stricture the bowel was distended and hypertrophied, while below it was contracted and empty. Enterotomy was performed in the dilated portion. Sixteen days later the damaged bowel was resected, and the ends were joined by means of a Murphy button. He was up and out of bed in a fortnight, and passed the button on the fifty-first day. He has been in the best of health ever since.

The portion of bowel removed measured 43 cms. The distended upper end possessed a lumen of 5 cms. in diameter. The proximal stricture was 1.5 cm. in length and 8 mm. in diameter, and its wall consisted of firm fibrous tissue. Microscopical examination showed that the mucous and submucous coats had been entirely replaced by fibrous tissue. The distal stricture took the form of a shallow circular groove, resulting from the formation of fibrous tissue in the situation of the peritoneum and outer longitudinal muscular coat.

Similar cases of stricture of the gut following strangulated inguinal hernia have been recorded by Nicaise, Garré, Maas, Kellock, and others. Mr. Caird¹ has described and figured a narrow pyloric-like contraction which developed at the seat of constriction after operations for strangulated femoral hernia, and which, operative interference being refused, proved fatal seven months later.

¹ *Edin. Med. Journ.*, March 1890.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

The International Text-book of Surgery. By British and American Authors. Edited by PEARCE GOULD and COLLINS WARREN. Philadelphia and London: W. B. Saunders. 1900.

THIS handsomely equipped work, in two bulky volumes, is the most imposing text-book of surgery which has for long been submitted to us for review. It is edited by Collins Warren and Pearce Gould, and is the joint production of a long list of American and English writers. Among the contributors are many whose names are of world-wide reputation as authorities upon subjects which they have made their own. It was to be expected that the work would attain a very high standard of excellence, for neither talent, industry, nor money have been spared in its production; but while vastly superior to already existing text-books in many important respects, it fails lamentably in others. Many of the articles by acknowledged authorities may be fairly described as master-pieces of surgical literature; there remains, however, a goodly number which would detract from the value of any work, and which in a subsequent edition should be deleted and rewritten. It is noticeable that in a certain number of these undesirable contributions, the author appears to have relied too much on the influence of illustrations as a means of conveying information to the reader. Vol. i. is devoted to "General and Operative Surgery," and vol. ii. to the "Surgery of Special Regions or Departments," although for some reason or other the articles on the cranium and spine are found in the first, while the general article on syphilis comes late in the second. The index is a most exhaustive one, and yet it has baffled us on several occasions. We have not yet succeeded in finding tuberculous abscess or ulcer, Coley's fluid, transfusion of blood, ingrowing toe-nail, perforating ulcer of foot, onychia, or neuritis; we should hesitate to say that none of these are described in so large a work, but we cannot find them. While appreciating the alleged advantages of Transatlantic spelling, we venture to draw the line at "fluidram," and would fain hope that it is unintentional. In both volumes there is a wealth of illustrations of unsurpassed excellence and great teaching value—certainly superior to any other work of the kind; we cannot say the same of the coloured plates, for in the majority it would be impossible to guess at what they are intended to represent. The numerous skiagrams are unusually successful; the inevitable exceptions, such as that intended to show displacement of the semilunar cartilage, are few and far between.

The work is on too large a scale to permit of systematic criticism.

The first volume opens with a useful chapter on "Surgical Bacteriology," followed by excellent articles on the "Infective Diseases," by the American editor. Cabot is responsible for an article on the "Surgical Pathology of the Blood"—a most desirable innovation in a text-book of surgery. Antistreptococcic serum is not even mentioned in relation to erysipelas. Spencer writes with his usual thoroughness on "Gangrene," but has not succeeded in giving a clear statement of what must always be to the student a very difficult subject. The "Technique of Aseptic Surgery" has been well placed in the hands of M'Burney; it would be impossible to find a better article. Cameron writes on "Surgical Tuberculosis," Warren on "Operative Surgery," and Da Costa on "Minor Surgery." The article on "Anæsthetics" is a good one, and is written with a strong bias in favour of ether. Bland Sutton is responsible for the chapter on "Tumours"; it is in keeping with his reputation, but curiously omits altogether the question of treatment. The article on "Fractures" by Pilcher is an extremely able one, but contains no evidence that the author is familiar with the work of Bennett of Dublin, our greatest living authority on fractures. Makins writes on "Dislocations," and Watson Cheyne on the "Diseases of Bones," with authority and precision. The general article on "Diseases of Joints" is one of the most disappointing in the whole work; we have seldom read anything of the same compass which conveyed so little instruction. "Diseases of Special Joints," contributed by Rushton Parker, will be found of the greatest use to the practitioner. The article on "Diseases of Blood Vessels" suffers through being very unequal in scope; it is incomplete in angioma and aneurysm, and repeats the threadbare statement that tight-lacing and garters are causes of varicose veins. In the following article on "Tendon Sheaths and Bursæ," we might suggest a revision of the pathology of ganglion, which is still described as a diverticulum from the sheath of a tendon. The chapter on the "Peripheral Nerves," although very largely operative in scope, is an extremely valuable one.

The second volume, dealing with "Regional and Special Surgery," is a most valuable addition to surgical literature. Of most of the contributions we may say that we have never read, within the same compass, better written, more practical, or more instructive articles on their respective subjects. Where the general standard is so high, it may seem invidious to make any selection, but we have read with special satisfaction those on "Peritonitis" by Abbe, the "Diagnosis of Abdominal Diseases" by Mayo Robson, the "Vermiform Appendix" by M'Burney, "Hernia" by Bull and Coley, the "Kidney" by Fenger, and "Syphilis" by R. W. Parker.

There are important chapters on "Gynecology," "The Eye," "Ear," "Skin," on "Military, Naval, and Tropical Surgery," the last by James Cantlie.

ALEXIS THOMSON.

Die Spezielle Chirurgie. Von Dr. EDMUND LESER, Professor an der Universität in Halle. Berlin: J. Fischer.

THIS work of Professor Leser is in sixty lectures, in the course of which most surgical affections are described in a terse and satisfactory manner. General surgery is omitted entirely from the volume, thus necessitating

that the student read one author for the principles and another for the practice of surgery. Nominally the book consists of sixty lectures, but it is impossible that any teacher could get into the space of an hour's lecture half the matter contained in any of these lectures. Thus Lecture iv., "On the Surgery of the Face and of the Bony Framework of the Face," consists of twenty-eight large pages of close print, and would correspond to at least three or four ordinary lectures.

No fault can be found with the work as a student's text-book of special surgery, and it has in Germany proved a distinct success, having passed through four editions in ten years. For English readers, however, it has little value. It is in no way comparable to the scarcely larger work of Tillmann's, or to the much more comprehensive work of König, which will no doubt continue the favourite books for English readers.

HERBERT F. WATERHOUSE.

A Manual of Surgical Treatment. By W. WATSON CHEYNE, M.B., F.R.C.S., F.R.S.; and F. F. BURGHARD, M.D., M.S. (Lond.), F.R.C.S. (Eng.). In six parts. Part iv. "The Treatment of the Surgical Affections of the Joints (including Excisions) and the Spine." London: Longmans, Green & Co.

THIS instalment, though consisting of 360 pages, leaves on our mind the impression that either this great work will not be completed in six parts, or that the two remaining parts will require to be very bulky volumes.

The present volume is roughly divisible into four sections equal in length—(1) Dislocations, (2) Diseases of Joints in General, (3) Diseases of Individual Joints, and (4) Surgical Affections of the Spine. Little fault can be found with either the matter contained in the volume or the manner in which it is presented to the reader.

We are told with regard to the treatment of dislocation of the internal semilunar cartilage of the knee, that "when the patient is seen immediately after the accident has occurred for the first time . . . a splint should be employed to keep the knee fully extended, and this should be worn continuously for at least three months." The authors have apparently not tried the method of Schäffer, who, whilst preventing rotation, keeps the knee in a position of slight flexion by raising the heel. This method has yielded in our hands much better results than that of full extension of the joint. We are glad to notice that removal of the semilunar cartilage is in general recommended rather than attempting to suture it into position.

In the treatment of rheumatoid arthritis of the knee, we note that excision is held to be justifiable when the pain is so great as to prevent the patient getting about, and when this is the only joint affected. There is no doubt that in certain cases the results of this operation are satisfactory, though the cases must be carefully selected. We are pleased to learn that the injection of 10 per cent. iodoform glycerin emulsion into the interior of tuberculous joints is admitted "often to give remarkably good results." From this method, especially in the case of children, we have obtained, in certain cases, wonderfully successful results.

The article "Scoliosis" is one of the best in the book, and an appendix on "Medical Gymnastic Exercises," taken verbatim from Dr. Lewis' book on "The Relief and Cure of Spinal Curvature," should be read by every medical practitioner. Taken altogether, this work is for the advanced student of surgery one of the most valuable to be found in any language.

HERBERT F. WATERHOUSE.

Twentieth Century Practice: An International Encyclopedia of Modern Medical Science. Edited by THOMAS L. STEDMAN, M.D. In Twenty Volumes. Volume xx. London: Sampson Low & Co. 1900.

"THE Twentieth Century Practice of Medicine," which is now complete in twenty volumes, may justly claim to be the largest if not the most important treatise on medicine in the English language which has appeared since the publication of the translation of Ziemssen's "Cyclopedia." Taken as a whole, it may not have attained such a high standard of general excellence as did the great German work or one at least of the recent shorter systems of medicine, but nevertheless it forms a valuable work of reference, and contains many authoritative treatises by men of high standing in the medical world.

In the preface to the twentieth and last volume of the work, which is that with which at present we are more immediately concerned, the editor explains that the original plan of the work has had to be departed from on account of various causes, with the result that the articles in the several volumes have sometimes appeared in irregular order. Without some explanation of this kind we should have been at a loss to understand how tuberculosis and snake bite, yellow fever and mushroom poisoning, diseases of the uvula, soft palate and faucial pillars, and neural and mental defects in children, came to be considered side by side in one volume.

Of the 900 pages comprised in this volume, about 400 are taken up with tuberculosis, about 200 with yellow fever and the other miscellaneous subjects, and the remaining 300 with the general index. If one whole volume had been devoted to the subject of tuberculosis, it would have been none too little, and we cannot consider that 400 pages out of a total of some 18,000 pages provide an adequate proportionate amount of space for the discussion of a subject of such vast importance.

Four writers, Drs. Lartigau, Berg, Knopf, and Bowen, contribute the sections on tuberculosis. Dr. Lartigau's article on the bacteriology, pathology, and etiology of tubercle extends to about 140 pages. While he gives a good summary of present knowledge in regard to bacteriology and etiology, his account of the morbid anatomy has unfortunately been limited to the pulmonary lesions, and it would have been more satisfactory if he had been able to present a broader view of the subject, and describe the tuberculous lesions as they affect all parts of the body. In chronic phthisis, Dr. Lartigau says one of its most characteristic features is the tendency of the products of inflammation to degenerative and necrotic processes leading to the formation of cavities, which usually contain a variable quantity of ill-smelling material. It can hardly be said to be the rule for the pus in the interior of tuberculous cavities to be offensive. While admitting that cavity formation is a very important characteristic of chronic phthisis, we consider that greater stress should

have been laid on the process of fibrosis, which is really what lies at the root of chronicity.

Dr. Henry W. Berg, who is the author of the article on symptomatology, no doubt possesses a wide clinical experience. He, however, has not done himself justice, for his writing lacks individuality, and might quite well have come from the pen of some one whose knowledge of the disease had been gained rather in the study than at the bedside or consulting-room. In the sections on diagnosis, prognosis, prophylaxis, and treatment, Dr. S. A. Knopf reproduces a good deal of what he has already said so well in his recent book on Sanatoria.

In Dr. John T. Bowen's monograph on tuberculosis of the skin, we miss any reference to Finsen's light treatment, which promises to be so successful in this local form of tubercle, and in any case merits notice in an up-to-date work.

In the bibliographical references, which are appended to all the articles on tuberculosis except Dr. Bowen's, but scanty justice is done to English writers, some of whose most important works are altogether omitted from the list, while some of the English authorities referred to are scarcely recognisable under the names given to them. Thus Watson Cheyne's "Harveian Lectures" are referred to as Walter's "Harveian Lectures," Pollock is called Pollack, and Walters appears as Walthers.

Most of the illustrations we recognise as old friends reproduced from the works of Straus, Delafield and Prudden, and Knopf. We do not think the illustrations intended to show the facies of incipient and advanced phthisis are very successful. The so-called incipient case is much more like a chronic case with excavation, while there is nothing very typical about the advanced case except the extreme emaciation.

Dr. Wolfred Nelson has contributed a very readable article on yellow fever, in which he gives much important geographical and historical information, specially valuable because the writer has had exceptional opportunities for studying the disease in its principal habitats. The claim of yellow fever to be considered a filth disease is made stronger than ever, if that were possible, by the evidence adduced by Dr. Nelson concerning the state of the seaport towns of the Gulf of Mexico and on the eastern coast of South America.

The article on "Poisoning with Snake Venom," by Dr. Thomas R. Brown, gives an interesting account of the valuable work done by Professor Fraser, Calmette, and others in their endeavours to obtain an antitoxine. Dr. Francis Warner writes on a subject which he has made his own, and his article on "Neural and Mental Defects in Childhood" is very instructive. We cannot help thinking that the clergyman's son, who, having overheard his father say a locum tenens was coming, ferreted out the address and telegraphed to the substitute not to come, must have been related to the heavenly twins.

The general index seems to have been carefully compiled and to be as full as is necessary.

HECTOR MACKENZIE.

Laryngeal Phthisis, or Consumption of the Throat. By RICHARD LAKE, F.R.C.S. London: Rebman Limited. 1901.

THE importance of the subject of laryngeal tuberculosis can hardly be over-estimated. The prevalence of the affection, its frequent painful nature, and the serious interference which it may cause in the acts of

vocalisation, deglutition, and respiration, call for a careful study of this disease in all its aspects. We welcome, therefore, a further opportunity of studying the clinical features of laryngeal phthisis, and of observing the results of treatment. Mr. Lake bases his descriptions upon the observation and treatment of over 300 cases. We must confess, however, to a feeling of disappointment that the author, with such a wealth of clinical material, has not more fully elaborated his somewhat sketchy account of the disease. With so large a number of cases to form his text, and with the valuable clinical experience which a study of them must have given him, he had a great opportunity of presenting the profession with a complete monograph on the subject. We do not think that the book before us can be regarded as such. The general symptoms and local appearances of laryngeal phthisis are briefly described. It is natural that we should turn with special interest to the chapter on treatment, where we read that the author has obtained a cure in forty-eight cases out of a total of 329; this is equivalent to a percentage of $14\frac{1}{2}$. Heryng obtained twenty cures out of 200 cases, that is, 8 per cent. We must congratulate Mr. Lake upon his excellent results. He speaks well of the direct application of formalin to the larynx, using from $\frac{1}{2}$ per cent. to 4 per cent. of the pure drug, or from 1 to 10 per cent. of the commercial product. The general considerations which should influence the surgeon for or against operative interference, and the different methods of operating, are next briefly dealt with. A short chapter is also devoted to pathology, and another to an account of certain of the author's illustrative cases. A number of coloured plates are well executed, and a useful appendix is added, containing in prescription form various local applications that may with advantage be employed. Certain errors in the text point to a somewhat hasty perusal of the proof-sheets.

Although we have, perhaps, somewhat adversely criticised this book, on account of what it lacks, we can cordially recommend it to the notice of all who take a practical interest in the disease of which it treats.

A. LOGAN TURNER.

Lectures on Nasal Obstruction. By A. MARMADUKE SHEILD, M.B., F.R.C.S. London: Rebman Limited. 1900.

THIS little work of one hundred pages contains the substance of three clinical lectures delivered by the author to the students of St. George's Hospital, London. The causes and the differential diagnosis of the chief varieties of nasal obstruction are dealt with in the first place; the treatment of these conditions forms the subject of the second lecture; and the third is specially devoted to a consideration of the removal of nasal polypi. While it is impossible, in a small book of this kind, to enter into a detailed account of the various conditions which may give rise to nasal obstruction, Mr. Sheild has been able to place before the reader a short but useful description of the more common affections. We think, however, that he might with advantage have introduced the subject of nasal tuberculosis, including lupus, so that the reader's thoughts might at any rate have been directed towards such an important lesion. In dealing with the more common diseases of the nose, the author gives much practical advice, largely based upon his own

clinical experience. The subject of adenoids is discussed in considerable detail, and the possible risks connected with their removal are pointed out. A number of useful drawings are scattered about the text. In short, the student of rhinology will find in these lectures a guide to the recognition and treatment of the commoner forms of nasal obstruction.

A. LOGAN TURNER.

The Johns Hopkins Hospital Reports. Vol. viii. Nos. 3-9. Baltimore :
The Johns Hopkins Press. 1900.

THIS valuable volume is devoted to a consideration of some of the difficult problems which surround the study of typhoid fever. There are seventeen papers in all, some long and some short, but all good and well worth reading. It is impossible in the short space at our disposal to notice them all, however shortly. A few of them are more directly of a surgical nature, notably those of Finney on the surgical treatment of perforating typhoid ulcer, and of Cushing on laparotomy for intestinal perforation in typhoid fever; but most of the papers will appeal more strongly to the physician or the pathologist. Finney says that most reliance is to be placed, in the diagnosis of perforation of a typhoid ulcer, upon severe continued abdominal pain, coupled with nausea and vomiting, and a marked leucocytosis. Cushing shows that this latter sign is often absent, which is further demonstrated by Thayer in his particularly exhaustive and instructive paper on the blood in typhoid fever at the end of the volume. This latter paper is devoted to the study of the blood, both in uncomplicated and complicated cases of typhoid fever, and will be found full of interest, alike by the physician and surgeon, and by the student of blood changes. Flexner discusses the important subject of unusual forms of infection with typhoid bacillus, and shows how cases with insignificant intestinal lesions, cases in which the brunt of the infection falls upon the spleen (spleno-typhoid), and cases of septicæmia, with no local lesions, etc., can all be brought into harmony, owing to the advances made in the bacteriology of the disease. Mitchell reviews the literature and nature of the œsophageal lesions met with in typhoid, and holds that whether they be primary or secondary lesions, the results to which they give rise are so important that they merit more attention than has been paid to them in the past. Dobbin records a case in which he believes that the puerperal fever which followed parturition was caused by an infection of the uterus with the typhoid bacillus. The gall bladder complications of typhoid fever are considered by Camac first from a historical standpoint, and then from the practical side of the anatomy and physiology of the gall bladder. He then gives particulars of cases of cholecystitis complicating typhoid, of this condition following upon typhoid, of cholelithiasis as a sequel to typhoid, and discusses their symptoms, diagnosis, prognosis, and treatment. Osler records four cases of hemiplegia in typhoid fever, an extremely rare condition even in children, in whom it is not an infrequent accident in the specific fevers. Two of them recovered and two died, one of the latter having thrombosis of the ascending parietal and parieto-temporal branches of the middle cerebral artery, and the other an area of thrombotic softening in the internal capsule. The same author gives an excellent paper on the hepatic complications of typhoid fever, which he

discusses under the three heads—the focal necrosis, jaundice in the course of the disease, and abscess; and another paper in which he gives a useful analysis and general summary of 829 cases of typhoid fever, treated in the Johns Hopkins Hospital from 1889 to 1899. There are other papers on cystitis due to the typhoid bacillus and on the Widal reaction which will repay perusal. We recommend the volume to all interested in typhoid fever.

R. F. C. LEITH.

Text-Book of Embryology. By JOHN CLEMENT HEISLER, M.D., Professor of Anatomy in the Medico-Chirurgical College, Philadelphia. With 190 Illustrations. Philadelphia and London: W. B. Saunders & Co.

THE medical student, for whom it is intended, will no doubt welcome this book, and look upon it as an advance upon the text-books of embryology previously at his command, for the descriptions of developmental phenomena are in many cases short and apparently clear, the illustrations for the most part are good and to the point, and the subject matter is well arranged. Prof. Heisler is also to be congratulated upon not having hesitated to repeat a statement when such repetition has been necessary to render two or more sections of his book complete in themselves.

Unfortunately, however, the apparent clearness has been gained in some cases by dogmatic statements concerning doubtful and disputable points; and although it is allowable for the writer of a text-book to be dogmatic, under certain conditions, it cannot be conducive to the best interests of the student that the difficulties of the subject should be hidden from him merely for the sake of brevity and apparent clearness, nor can continuity and clearness of description be looked upon as legitimately gained if they are obtained by want of definite distinction between what is *known* concerning human development, and what is only *inferred* from knowledge of developmental processes in other vertebrates.

Defects of this kind are undoubtedly present in the book, and inaccuracies are not entirely absent. For example, it is stated on p. 22 that the head of a spermatozoon, seen in profile, is convex on one side and concave on the other; on p. 54 it is asserted that the primitive streak plays no part in the later stages of development; and, on p. 64, that the entire primitive streak is made to disappear by being included within the neural tube,—and neither of these statements can be said to be supported by the facts of the case.

The diagrams showing the relation of the allantoic diverticulum to the mesoderm are misleading. The figure of the pharyngeal membrane is incorrect, inasmuch as it shows a layer of mesoderm between the ectoderm and entoderm. In the description of the amnion folds it is asserted that the head amnion fold is for a time destitute of mesoderm, "since it corresponds to that region of the wall of the blastodermic vesicle described on p. 56 as the proamnion." This is one of the statements in which human embryology is not sufficiently differentiated from that of other vertebrates; for although the proamnion is a well-known structure in many forms, it has never been demonstrated satisfactorily in the human subject, and there is every probability that it does not exist.

Other examples of a similar nature might be cited, but sufficient has been said to show that the book, though it has many admirable

qualities, will require careful revision before it can be recommended without reserve to those who are only commencing the study of embryology.

ARTHUR ROBINSON.

Medical Examination for Life Insurance. By CHARLES LYMAN GREENE, M.D. London: Rebman Limited. 1901.

AMERICANS appear to be as go-ahead in life assurance work as they have shown themselves to be in various other spheres. One has but to read over a medical report form issued by any of their larger offices, to grasp that very much more information is required as to the history, condition, and physical traits of the examined from their medical officers, than the run of insurance companies in this country desiderate. Dr. Greene's book is another witness to this, for it not only enters into life assurance—historically, technically, and actuarially—but also contains within its pages as much clinical description and detail as might almost fit it for the rôle of a clinical manual.

The gradual evolution of the elaborate methods of modern life assurance, from erstwhile fanciful schemes and inefficient arrangements, is well described in the first chapter. It seems, truly, that medical referees of assurance societies primarily owe their position to the necessity such corporations were placed under to establish some reliable form of check over the acts of their agents, who, tempted by the commission paid on each case introduced by them, were frequently found to resort to shady methods in the procural of proposers. The health of the assurer mattered little, the probable chance of an early demise was outweighed by the certainty, if accepted, of a sum in commission, and often, as the author hints, of a bribe as well. It is only fair to state that the view of Holden on this subject is also given, *i.e.* that medical examinations of life assurance proposers dates from, and was due to, the adoption of auscultatory and percussional clinical methods by the profession, and the consequent advance in physical diagnosis afforded by them.

This historical retrospect occupies rather more than half of the first chapter, the remaining portion of which is devoted to details of greater and less technicality, relative to actuarial and statistical principles. A very useful table is given, in which the number of survivors each year out of 100,000 persons alive at 10 years of age, and the yearly wastage by death, are given, along with their corresponding logarithms and the calculated expectation of life at each successive age.

The duties and responsibilities of the medical examiner are next dealt with, and at great length, the clinical part being especially good and excellently illustrated. The insurance of sub-standard lives is next considered; attempts to defraud insurance societies discussed; and finally the principles of accident insurance, as they affect medical men, expounded.

Dr. Greene's work is strongly to be recommended to the profession, even if it bears some resemblance to an insurance apotheosis. If it does contain a certain amount of superfluous material for the ordinary medical examiners in this country, it assuredly misses out little that is of service. It is splendidly illustrated with numerous graphic charts and figures, many of them in colour.

A. LOCKHART GILLESPIE.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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SMALLPOX IN LYONS.

MM. COURMONT, Bancel, Montagard, Prat, and Pravaz (*Presse med.*, Paris, 23rd March 1901) have published an analysis of a large number of cases of smallpox as noted by them in Lyons between January and November 1900. The epidemic originally began in December 1899, increased until March 1900, and, after lessening in severity during April, again became more widespread in May, to gradually disappear from June to November. In the Lyons Fever Hospital, 912 cases in all were treated, the death-rate reaching 18 per cent.; the authors discuss 792 cases, 142 of whom succumbed, or 17·9 per cent.

The first point of interest observed by them was the great predominance of females among those attacked, 449 women to 343 men. Under 1 year of age, and between 1 and 10, the number of female patients only slightly exceeded that of the males; between the ages of 11 and 20, the number of males was double that of the females. From 21 to 30, and 31 to 50 years, on the other hand, the latter were practically as two to one of the former; above 50 they were also more numerous, but in smaller proportion. The smaller number of males over 20 years of age, the authors attribute, without hesitation, to the fact that all members of this sex who have served in the army had had to undergo revaccination on joining the colours. Reference to any of the pre-vaccination authorities upon smallpox shows that, everything being equal, males suffer in larger proportion than females. The excess of male cases noted between the ages of 11 and 20 corroborates this, for it is not until 20 years have been passed that the military revaccination regulations commence to exert an influence. Over 50 years of age the protective power conferred upon males by revaccination has largely disappeared; here the fact that the operation has been performed seems to but slightly benefit the subjects of it, as to their liability to development of smallpox; or the mortality returns here adduced give only a small increase in the death-rate among males over 50 suffering from that disease compared with females, an excess equal to 8 per cent.; the

actual number of female cases above 50 showing an increase of 20·8 per cent. over that of the males. In forty-four of the total number, primary hæmorrhagic variola occurred—fifteen in males, or 34 per cent.; twenty-nine in females, or 66 per cent.; all save one of these attacks proved fatal.

Of the forty-four patients who developed primary hæmorrhagic variola, twenty-three, or more than one-half, were unvaccinated; twenty-one, or slightly less than one-half, had not undergone vaccination within ten years of the onset of the disease; one exhibited coexistent signs of vaccinia. In no case had the patient been vaccinated or revaccinated within ten years before the onset, except the single patient vaccinated after infection by smallpox.

One hundred and fifty of the total 792 cases had never been vaccinated; of these, 127 suffered from severe types of the disease, and seventy-five died, or 52 per cent., fifty-two recovering; twenty-three exhibited but mild symptoms. Five hundred and eighty had been vaccinated more than ten years previously; 163 of these suffered severely, with sixty-three deaths, or 10·8 per cent.; 417 had mild attacks. Twenty-two had been vaccinated less than ten years before, and all experienced benign attacks, although one (4 per cent.) died from broncho-pneumonia. Sixteen patients were admitted with active vaccinia at the time; of these, two died (12 per cent.), and only four were of a mild nature. The remaining twenty-four cases had been vaccinated more than once; one of them died (4 per cent.).

That more than one-half of those who developed the primary hæmorrhagic type of smallpox were unvaccinated, while the proportion of unvaccinated to vaccinated in the total 792 only amounts to 18·9 per cent., is noteworthy. The much higher mortality among the female patients, from 20 to 60 years of age, 18 per cent. to 14 per cent. in males, is also important. That in as many as twenty-four patients smallpox developed in spite of multiple vaccinations, is significant, not of the insufficiency of the process, but of the comparative frequency with which instances obtain of an unusual susceptibility towards cowpox, along with but a brief period of immunity. All those individuals who have been revaccinated within short periods, and have reacted briskly on each occasion, should be regarded as particularly susceptible to the virus of cowpox, therefore also to that of smallpox; and as protected from smallpox by any one act of vaccination for an unusually short time. Among the complications observed were four cases of purulent ophthalmia, and forty-four cases in which vesicles and pustules appeared on the conjunctiva. In several cases, amaurosis, more or less pronounced, developed during convalescence. Albuminuria, transitory but for two cases, occurred in ninety-three; its prognostic value is nil.

Examination of the blood afforded evidence of a special form of variolous leucocytosis, mononuclear, and particularly affecting the myelocytes. Courmont and Montagard (*Journ. de l'anat. physiol., etc.*, Paris, July and Sept. 1900) have already pointed out the value of this for diagnosis. By means of it they were able to disprove several errors of diagnosis, such as two cases of polymorphic erythema, one of infectious pseudo-rheumatism, another of febrile syphilitic ecthyma, etc.

In five patients with advanced tuberculous disease who were attacked by smallpox, death quickly supervened. Two with pulmonary phthisis

at an early stage exhibited no special symptoms; although other two with consolidated orifices, on recovery from smallpox, were found to be markedly improved by reason of the absence of their former febrile symptoms, and lessened cough and expectoration.

Twenty-one of the female patients were advanced from four to eight and a half months in pregnancy; five of these suffered no harm; sixteen either aborted or were delivered prematurely, eight of the sixteen dying. Four of these deaths occurred after abortion in cases of mild variola without apparent cause; some hours after confinement the patients became distressed, breathless, with tachycardia, and died from syncope. Two of the infants thus born survived without taking smallpox, and proved immune to vaccination.

As to means of combating the complications of smallpox, isolation of those patients attacked by broncho-pneumonia, and abstaining from sweeping the wards and rooms occupied by the patients, will prevent a certain proportion of the pulmonary secondary infection. The suppuration in the pustules of smallpox is of specific origin; the pus in them is generally free from common pyogenic organisms. The frequent occurrence of boils and abscesses in the later stages of smallpox is mainly due to secondary infection, and may be rendered less common if antiseptic safeguards be adopted, and hygienic measures respected. Warm baths with corrosive sublimate added to the water, were found by the authors to yield excellent results.

THE COMPLICATIONS OF CHICKENPOX.

ALTHOUGH chickenpox in the great majority of cases is not a dangerous or severe disease, in a small number complications and sequelæ of some gravity are met with. Krause (*Munchen. med. Wchnschr.*, March 5, 1901) is inclined to doubt the accuracy of many previously recorded observations, in which pleuro-pneumonia, pleurisy, acute arthritis, etc., have been ascribed to varicellar infection.

Henoch, in 1884, announced that he recognised a *nephritis varicellosa*. Since then a large number of observers have put analogous cases on record. Post-mortem investigation, however, has only been possible in one or two of these cases, so that Krause, having seen two fatal cases of varicella with nephritis in whom autopsies were allowed, deemed them worthy of publicity.

The first case was that of a girl, 3 years of age, typically and extremely rachitic, covered over the whole surface of her body with chickenpox vesicles, her lymphatic glands, especially the inguinal, enlarged, and with profuse discharge from an otitis media sinistra. The urine contained no albumin until the eleventh day after admission into hospital, on which day a small amount was discovered, along with numerous hyaline and granular coats, red and white blood corpuscles. The eyelids were slightly œdematous. Three days later the amount of albumin had increased greatly, the temperature had risen to 39° and 40°·2 C. (102° and 104° F.), while, despite hot packing, the œdema increased. Next day, increase of œdema, of albumin in the urine; and on the following day death, with a temperature of 104° F.

On autopsy an acute parenchymatous nephritis was found, a slightly

fatty liver, with considerable portal congestion. During life streptococci were grown from the ear discharge; the urine proved sterile, as also the chickenpox vesicles. After death no organism developed in cultures made from the liver, bile, spleen, and kidneys.

In another similar case, extracted by Krause from the Hamburg Hospital records, the kidneys showed the same condition, but contained streptococci; lobular pneumonia, hepatitis (with streptococci), and necrosis of the glottis were also present.

In a number of previously recorded cases of *nephritis varicellosa*, otitis media constituted a further complicatory lesion, and especially where pyogenic organisms of the same class were found both in the pus from the ear and the urine or kidney substance, the nephritis in them can be ascribed more readily to the ear disease than the chickenpox. In the first case reported by Krause, however, the urine and organs were sterile, leading to the conclusion that a nephritis of pure varicellar origin may be possible.

SMALLPOX IN PARIS.

ROGER (*Presse méd.*, Paris, February 23, 1901) puts the question, "Why has the epidemic not yet subsided?" and proceeds to argue its pros and cons before attempting to answer it. From 1896 to 1898, only sixty cases of smallpox were treated in the Aubervillier Hospital, the last of the series in June 1898. No other case was noted until December 1899. In 1900, 900 patients were admitted, and this year up to the date of the paper three or four cases a day came in for treatment.

Why, then, does the epidemic persist, when simply vaccination suffices, as it seems, to arrest it? Because of the laziness of the inhabitants, their disbelief in the necessity for revaccination, and, in some cases, the desire for self-advertisement or hope of local celebrity, arising from their refusal to believe in the benefits conferred by the operation. Not only should there be a law rendering vaccination compulsory, but another, equally rigorous, compelling revaccination of the population.

MIGRAINE.

THE more common and impartial an ailment is, the more obscure and debatable does its etiology appear to be. Hemicrania, migraine, or megrim belongs to this class. Although a "sick headache" has for ages been a household word, and in a great many households has been practically encountered, yet the method of its causation is far less understood than in many much more subtle affections of comparatively rare occurrence. Sihle (*Wien. klin. Wchnschr.*, March 28, 1901) contributes a comprehensive article to the already large literature on the subject; himself a sufferer from migraine, as so many of those who have written about it have been.

His anamnesis is given in the frankest of manners: æt. 38, his father died at 74 from typhlitis, having been the subject of chronic bronchitis and bronchiectasis for many years; his mother, 77 years of age, has suffered from typical headaches, without ocular symptoms, from early years. One of her brothers was an epileptic. The writer is the youngest

of seven; two of the family developed in their twentieth year coughs and hæmoptysis. In both, these symptoms eventually disappeared. Another brother had a fatty heart, suffered from periodic headaches, and died at 51 from typhoid fever. A sister is strumous, a brother rheumatic and subject to migraine, and one brother is healthy. Sihle himself, when 20 years old (apparently a critical age for his family), began to suffer from prolonged periods of coughing. When 29, developed pleurisy with effusion, followed by occasional hæmoptysis and such loss of weight, that a year afterwards he was lighter by about 6 kilos, or almost a stone. At this time he began to be troubled with ocular disturbances, followed by headache. Tubercle bacilli were detected in the sputum; laryngeal phthisis and double apical catarrh diagnosed. The migrainal attacks continued to recur four or five times a month. Residence at Moskau in the Crimea, with fresh air treatment, brought about the disappearance of the phthisical symptoms, and in three years time he was able to resume his ordinary duties in Odessa.

Sihle then began to pay more attention to these phenomena accompanying his migraine seizures, which by this time occurred at longer intervals. He noted down, every minute or two minutes during an attack, a description of the subjective ocular forms, as they appeared to him at the moment.

The notes made on the first attack, so made use of, speak of homonymous scotoma on both sides, most pronounced in the right eye. The actual accounts of his symptoms must be read in the original. Out of ten attacks especially studied, in three were the ocular images left, in seven right-sided, betokening pathological affection of the left hemisphere on seven occasions, of the right on three. While the attacks arising from disturbance of the right cerebrum were identical in their course and character, those due to the left varied much in method and progress. Perhaps in the right occipital lobe the nervous mechanism involved is less complex than on the left. The important point is, that hemicranial paroxysms can be initiated from either or both occipital lobes.

In migraine, other cortical areas also are often involved—of the parietal lobes, causing paræsthesiæ; the speech centres, etc. All these symptoms are of central origin. The pain, however, comes from a different source, following, as it does, after the symptoms of central nervous disturbance have subsided. What is the primary cause of migraine?—A cortical nerve storm, or a vasomotor disturbance leading to local contraction of vessels? Is it an auto-intoxication, as many, especially French, authorities suggest? Paraxanthin and excess of other xanthins have been shown by Rachford to be present in the urine during and for some time after a migraine attack, though at other times the paraxanthin is absent. Paraxanthin is a powerful poison. If it, or some body like it, be the underlying cause, it must especially disturb the cortical white matter, and that more particularly over the areas corresponding to the hemicranial symptoms. If it can be established that irritation of the cerebral meninges can give rise to the pain of migraine, the solution of the matter will be clear. Irritation of the dura only gives rise to pain; in leptomeningitis, where the lesion is chiefly located in the pia mater, intense pain occurs. The pia, then, may be regarded as the source of

migrainal pain. The temporal region is the most common situation of the pain—a region affected by pain in other intoxications.

If this hypothesis as to the source of the headache be correct, the explanation of the other symptoms is clearly explicable. Allowing first in migraine an increased sensitiveness to chemical agents on the part of some of the ganglion cells of the centres in the cortical layer of the brain, as well as in the subcortical ganglia, this sensitiveness perhaps increased more in one than in another, presence of a sufficiently strong irritant in the blood will cause disturbances in them, which are manifested in the symptoms of migraine.

For an attack, therefore, we require a pathological change in part of the cerebral cortex in relation to chemical poisons. The actual poison is immaterial. The uric acid and tuberculous diatheses, anæmia and metabolic disorders, all serve as sources of auto-intoxication. Frequently attacks of migraine are induced by special circumstances. Severe brain work, bright light, scents, and active digestive lesions, act as direct cerebral stimulants, but can only produce an attack if the conditions mentioned above are present.

Voss (*St. Petersb. med. Wchnschr.*, March 19, 1901), writing on the diagnosis of headaches, says of migraine that it occurs on both sides of the head not infrequently; secondly, that every one-sided headache is not necessarily migraine. The chief diagnostic points are:—That in 90 per cent. of all cases of migraine, heredity can be traced (Möbius); that it recurs at regular intervals; that during the intervals no pain is felt; and that the attack is accompanied by special general symptoms.

It should be remembered that organic lesions of the brain may occasion sympathetic attacks of migraine, and their occurrence after 30 years of age should always suggest some such origin, because, as a rule, as age advances the disease abates. Frequent attacks of migraine may lead without doubt to organic changes in the tissues of the areas most often involved by them, especially to arterio-sclerosis. Permanent ocular lesions may also persist, as Schröder has recorded. Voss gives details of a case of his own, in which thrombosis of the central artery of the retina or hæmorrhage into the sheath of the optic nerve occurred in a migrainic paroxysm.

SURGERY.

UNDER THE CHARGE OF

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RESECTION OF THE PENDULOUS ABDOMINAL WALL IN CASES OF EXTREME OBESITY.

LINDSAY PETERS of Baltimore reports a second case of the above, operated upon by Howard Kelly at the Johns Hopkins Hospital. The patient was a woman, æt. 32, who had been married eight years, and had given birth to one child. She had never had any serious illness, and was never

excessively stout until 22 years of age, when her breasts became large, flabby, and pendulous, so that, finally, they were almost disconnected from the body by their own weight. They were removed five years ago, and their combined weight after removal was nearly 25 lb. The abdomen, which hitherto had been of normal size, began to accumulate fat, and finally became very large, hanging down in pendulous folds. She was not a hearty eater, but since she began to lay on fat she has drunk a large amount of water. She weighs 285 lb. In the erect posture, the pendulous abdominal wall covers the upper portion of the thighs, and, when sitting, the lower border of the fold reaches to within 2 cms. of a line between the knees. The greatest circumference of the abdomen measures 200 cms. Beneath the fold of abdominal skin there was a long crease, affected with eczema intertrigo. The urine contained a considerable quantity of sugar.

On May 8, 1899, Kelly excised an enormous crescent of the abdominal skin and fat, weighing 7450 grms. The wound, when closed with sutures, measured 85 cms. (34 in.) in length. The patient was kept lying for one month after the operation. When discharged from hospital her weight had been reduced from 285 to 226 lb., and she was able to walk "very well indeed."—*Ann. Surg.*, Phila., March 1901.

REMOVAL OF THE LOWER EXTREMITY AND PART OF THE PELVIS FOR PERIOSTEAL SARCOMA OF THE FEMUR.

FREEMAN of Denver advocates the early and free removal by operation in cases of malignant disease, and records the following case in illustration of what may be accomplished in apparently hopeless cases:—

In July 1899 an emaciated woman applied for advice concerning an enormous sarcoma in the upper part of the right thigh. It extended well into the pelvis, where large masses could be felt above Poupart's ligament. The skin was implicated in front of the thigh, and well over towards the labium majus, and for a short distance on to the abdomen. Posteriorly, the skin was free. The growth was first noticed seven months previously as a swelling the size of an egg, just below the fold of the groin. Rapid increase in size took place, accompanied by much pain and oedema of the entire limb. The patient lost weight rapidly, and during the last two months had been unable to walk, even with the aid of crutches. The fatal nature of the malady was explained, and she was informed that an extensive hip-joint amputation offered her a small chance of recovery, with a large amount of risk. She decided to undergo the operation.

A skin flap was dissected up from the back of the thigh and buttock. An incision was made along Poupart's ligament, from near the symphysis pubis to beyond the anterior iliac spine. The peritoneum was turned upwards so as to expose the inner aspect of the pelvic girdle. Large nodules of tumour tissue were seen bulging upwards beneath the external iliac artery and vein, and the psoas and iliacus muscles. The external iliac was first tied, and then the common iliac a short distance above its bifurcation. It was then an easy matter to remove from the area exposed to view the malignant growth, the infected glands and the remainder of the soft tissues, including the muscles.

The hip-joint was opened and disarticulated from the front; all the muscles, including those of the gluteal region, were severed at their pelvic attachments. The loss of blood, excepting that in the amputated limb, was comparatively slight. The bone above the acetabulum being considerably involved, a large portion of the pelvis, from beyond the crest of the ilium to the pubes, was removed with the saw. The flaps were brought together. A moderate amount of shock occurred, but was successfully combated by stimulation and the injection of saline solution beneath the breasts, both during and after the operation.

She made a rapid and uneventful recovery, and was able to sit up in three weeks. Sixteen months after the operation she was reported to be in excellent health.—*Ann. Surg.*, Phila., March 1901.

ARTIFICIAL BRIDGE OF THE NOSE.

DR. DAWBURN presented to the New York Surgical Society a man, into whose nose he had introduced, one year previously, an artificial bridge, for the correction of a deformity due to a fracture of the nose, sustained at the age of $4\frac{1}{2}$ years. The result was most satisfactory. The material used was dental pink guttapercha. This was selected because it is non-irritating to the tissues, and is easily sterilised and softened by boiling water. It is easily made and shaped by fitting it upon the skin of the nose where the defect is, before any cutting is done. The technique of the operation is as follows:—The nostril on one side is clipped free from hairs, and both sides are syringed out repeatedly and packed for twelve hours with wet boric gauze. This is not removed till after the operation, thereby preventing blood running back into the pharynx. Under anæsthesia a cut is made well within the nostril, large enough to admit the new bridge endwise. The skin is then freed from the subjacent bone along the whole length of the nose, and as far outward as the infra-orbital vessels on either side. When the skin lies quite loose on the bone, the bleeding is checked by damp gauze packing, left in for ten minutes. Then the bridge of guttapercha is slipped into place, and is held there by a single steadying strip of plaster across the face. The wound heals without stitches. The author had only failed in one case, in which the patient desired a Roman nose; the general shape of his features appeared to give consent, so the new bridge was moulded accordingly, and all went well for a time. Finally, at the highest part of the Roman arch, the skin slowly sloughed, and when the slough separated, the pink guttapercha was revealed over an area as large as the finger nail. In two patients the final result was excellent, although some suppuration took place.—*Ann. Surg.*, Phila., January 1901.

LIGATURE OF THE ABDOMINAL AORTA.

MM. TILLAUX and Riche add another to the list of cases of ligature of the abdominal aorta, and contribute a useful paper summarising those already published. Although hitherto unsuccessful, the authors believe that the operation itself is not necessarily fatal. If the obliteration of the vessel is limited to the part ligatured, if the aorta is healthy, and the wound is aseptic, recovery is quite possible. Experience shows that

it does not result in gangrene, that congestive phenomena in the head and trunk are rare and unimportant, that paraplegic symptoms are inconstant, variable, and evanescent, and that the deaths are not directly attributable to the operation. The transperitoneal method is the operation to be selected.

GAUZE COMPRESS LEFT IN THE ABDOMEN.

CHAPUT records the case of a woman who had been operated on in 1891 for intra-uterine pregnancy. Two years later the abdominal scar yielded, forming a ventral hernia, and there was severe pain in the belly; a tumour was discovered lying to the left of the uterus. In 1897, the ventral hernia became strangulated, and was operated upon. Since the operation she has suffered from a fæcal fistula in the situation of the scar, and from severe pains. A hard mass was felt in the left side of the belly. The abdomen was opened in the middle line, and adhesions were separated. The hard mass when extruded from the wound was found to consist of a loop of intestine much dilated. At first thought to be a tumour of the bowel, the pasty consistence of the mass suggested its true nature; the intestine was opened and a compress of gauze extracted from its interior. The patient recovered without complications.—*Rev. de chir.*, Paris, January 1901.

SPINAL COCAINISATION.

WE have already reported on the results obtained by Tuffier and Fowler, by the injection of cocaine into the subarachnoid space in the lumbar regions. The chief drawback of this method of producing analgesia has been the frequent occurrence and persistence of severe headache and nausea. Schwartz has substituted tropacocaine, obtained from Merck in Darmstadt, with the result that these disagreeable accompaniments have disappeared. He obtained complete analgesia with 0.05 gm. of tropacocaine in cases of radical cure of hernia, external urethrotomy, Whitehead's operation for hæmorrhoids, etc.

UNUNITED FRACTURE OF THE TERMINAL PHALANX OF A FINGER.

W. MÜLLER of Aachen reports three cases, and furnishes corroborative skiagrams. The existence of this lesion was never suspected before the introduction of the Röntgen rays. In all three cases it followed upon a compound fracture, and was the cause of persistent disability. The treatment consists in laying bare the phalanx under local anæsthesia, and removing any soft tissue between the fragments likely to interfere with their union. In two of the cases in which this was performed, the result was most satisfactory.—*Centralbl. f. Chir.*, Leipzig, March 2, 1901.

TREATMENT OF ENTEROPTOSIS BY SUSPENSION OF VISCERA.

BLECHER describes the clinical features in enteroptosis, or Glénard's disease, and records a series of cases operated upon by Bier. As regards

prolapse of the stomach, instead of stitching the organ to the anterior abdominal wall, the gastro-hepatic omentum is shortened by folding it horizontally and fixing the folds by sutures. Bier prefers this method of artificially suspending the stomach, because it does not interfere with its normal movements. The procedure was followed by complete recovery in all four cases.

A case of ptosis of the colon is also recorded, in which a similar operation was performed. The patient, an adult male, suffered from persistent pains in the left side of the belly and from constipation. When the abdomen was opened, the left half of the transverse colon was found to have descended in the form of a loop, nearly to the level of the symphysis pubis. The mesocolon was shortened by folding it horizontally and stitching the folds together. The patient completely recovered. —*Centralbl. f. Chir.*, Leipzig, January 26, 1901.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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THE FREQUENCY OF BACKWARD DISPLACEMENTS OF THE UTERUS WITHOUT SYMPTOMS.

SCHRÖDER (*Ztschr. f. Geburtsh. u. Gynäk.*, Stuttgart, 1900, Bd. xliii. Heft 3), in order to solve this problem, has examined 411 cases, obtained as follows:—

Gynæcological Klinik	82 cases.
Maternity „	184 „
Medical „	145 „

He divided the cases according as the patients were nulliparæ, multiparæ, or after the menopause. None of the cases from the Maternity Klinik were examined within six weeks of the date of confinement, and cases with pelvic symptoms were contrasted with those without any symptoms.

The following are the results:—

I. NULLIPARÆ—90 cases.

30 Retro-displacements	= 33·33 per cent.
23 Retro-versions	= 23·55 „
7 Retro-flexions	= 7·78 „

1. Without pelvic symptoms—

(1) Virgo—25 cases.

10 Retro-displacements	= 40 per cent.
8 Retro-versions	= 32 „
2 Retro-flexions	= 8 „

(2) Torn hymen—49 cases.

14 Retro-displacements	= 28·57 per cent.
11 Retro-versions	= 22·45 „
3 Retro-flexions	= 5·12 „

2. *With pelvic symptoms*—16 cases.

6 Retro-displacements = 37·5 per cent.

4 Retro-versions = 25 „

2 Retro-flexions = 12·5 „

(1) *Virgo*—3 cases retro-displacements.

1 Retro-flexion = 33·33 per cent.

(2) *Torn hymen*—13 cases.

5 Retro-displacements = 38·46 per cent.

4 Retro-versions = 30·77 „

1 Retro-flexion = 7·69 „

II. *MULTIPARÆ*—276 cases.

71 Retro-displacements = 25·72 per cent.

40 Retro-versions = 14·47 „

31 Retro-flexions = 11·23 „

1. *Without pelvic symptoms*—191 cases.

42 Retro-displacements = 21·99 per cent.

25 Retro-versions = 13·09 „

17 Retro-flexions = 8·90 „

2. *With pelvic symptoms*—85 cases.

29 Retro-displacements = 34·12 per cent.

15 Retro-versions = 17·65 „

14 Retro-flexions = 16·47 „

III. *MENOPAUSE*—45 cases.

17 Retro-displacements = 37·78 per cent.

13 Retro-versions = 28·89 „

4 Retro-flexions = 8·89 „

1. *Without pelvic symptoms*—38 cases.

13 Retro-displacements = 34·21 per cent.

9 Retro-versions = 23·68 „

4 Retro-flexions = 10·53 „

2. *With pelvic symptoms*—7 cases.

Retro-version, 4 cases = 57·14 per cent.

From these tables Schröder further classifies the 411 cases—

Backward displacements—118 = 28·71 per cent.

Retro-versions 76 = 18·49 „

Retro-flexions 42 = 10·23 „

1. *Without pelvic symptoms*—303 cases.

Backward displacements—79 = 26 per cent.

Retro-versions 53 = 17·49 „

Retro-flexions 26 = 8·58 „

2. *With pelvic symptoms*—108 cases.

Backward displacements—39 = 36·11 per cent.

Retro-versions 23 = 21·3 „

Retro-flexions 16 = 14·81 „

Of ninety-three patients supposed to be in good health, Schröder found—

22 cases of backward displacement = 23·66 per cent.

16 Retro-versions = 17·21 „

6 Retro-flexions = 6·45 „

He quotes Carl Schröder, who writes in his text-book, “Backward displacement of the uterus of long duration is to be regarded as pathological.” But as the writer of this paper finds 25 per cent. of presumably healthy women with retro-displaced uteri, he thinks a more correct statement would be that in 75 per cent. of cases the uterus lies anteverted, in 25 per cent. retro-displaced, two-thirds of the latter being versions, one-third flexions.

Schröder describes the chief symptoms complained of. With regard to menstruation, he finds that of seventy-three cases, sixteen or twenty (25 per cent.) had profuse menstrual discharge. Of fifty-two cases, eighteen (34·62 per cent.) had aborted one to six times (many of those had also full-time children). He concludes that with the exception of fixed cases, backward displacements *per se* are of no clinical importance. Any symptoms present are always caused by surrounding inflammatory changes (in which the uterus frequently participates). He thinks much harm is done by practitioners informing their patients of the existence of a "displaced womb," harmless in itself, but frequently a cause of mental anxiety on the part of the patient.

UTERINE TUBERCULOSIS.

MICHAELIS, Munich (*Beitr. z. Geburtsh. u. Gynaek.*, Leipzig, Bd. iii. Heft 1), is of opinion that any part of the female genitalia may be the seat of isolated tuberculosis, but the cervix most rarely so.

He has had a patient under observation, a nullipara, æt. 33, who suffered from irregular and frequent hæmorrhage. She had no pulmonary disease. The os exhibited a small granulating, bleeding spot, the size of a sixpence, and total extirpation was performed, under suspicion of canceroid. In the cervical mucosa there were a large number of papillary outgrowths; at the external orifice microscopical examination showed that the squamous epithelium of the portio had perished. There were Langhan's giant cells in tuberculous tissue, the glands were very few, and some of them seemed to be almost solid from exuberant growth and metaplasia of the tissue.

The excrescences seen at the external orifice exhibited the appearance of papillary erosion, with here and there the epithelium and connective tissue replaced by a tissue interspersed with giant cells and tubercles. Towards the internal os the changes disappeared, no tubercle bacilli were found, and caseation had not begun. The patient is now quite well.

Michaelis reports two cases of secondary uterine tuberculosis, in which pulmonary affection and parametritic bands were present. In the first the uterus contained a polypus which had undergone tuberculous change.

CHORIONIC EPITHELIOMA OF THE VAGINA.

SCHMITT, Vienna (*Centralbl. f. Gynäk.*, Leipzig, 1900, No. 47), reports a case of a multipara, æt. 36, who had had five children and four abortions. Four months after the last abortion, which was an hydatid mole, she was admitted to Schauta's klinik, with two vaginal tumours, which on removal proved to be malignant syncytial growths, chorionic epitheliomata. The uterus was not implicated, as the shavings removed by curettage exhibited the ordinary appearance of endometritis interstitialis. The patient eight months after operation was perfectly well.

Schmorl and Schlagenhauser have described not only vaginal metastases of primary chorionic epithelioma of the uterus, but also cases

of similar growths in the vagina, after normal pregnancy of abortion, in which the uterus was perfectly sound.

Schmitt does not agree with Schlagenhauser that such growths may be a more benignant form of deciduoma, but considers early diagnosis and extirpation essential for cure.

He takes the same view as Pick, and attributes their origin to non-malignant villi which wander into the vaginal vessels, and when there develop malignancy.

ON THE ORIGIN OF THE HYDATID MOLE AND THE SO-CALLED DECIDUOMA MALIGNUM.

VAN DER HOEVEN (*Weekblad. Nederl. Tijdschr. v. Geneeskunde*, Nov. 8, 1900), in a paper on the above subject, arrives at the following conclusions:—There are grounds for referring the syncytium to the foetal ectoderm, and the cells of Langhan's layer to the somato-pleura. In a normal placenta the proliferation of these cells is of a character intermediate between ordinary innocent cell proliferation and that of a malignant kind. In a mole, however, these cells have a malignant character. The mole itself is a malignant growth of two germinal layers, in which the signs of malignancy are somewhat less prominent, because the cells have free room for their development. The tendency of the cell elements to develop in broad tracks through Nitabuch's fibrinous layer is one manifestation of malignancy. Even in normal pregnancy syncytium may be found in the decidua, but such extensive penetration of the fibrinous layer is never met with. Before or after delivery these cells perish of themselves or are destroyed by the maternal tissues, and so rendered innocuous. But in the case of a hydatid mole many more cells grow in the maternal tissues; they have, moreover, a much greater tendency to proliferation, and they grow into the muscular tissue. They have more vitality and so develop into deciduoma. Thus deciduoma will consist of syncytium, syncytium together with Langhan's cells, cells of Langhan's layer alone, or, perhaps, of syncytium, Langhan's cells and villous stroma. If the malignity of the mole is not marked, or if the mole be removed before the malignant proliferation has involved the maternal tissues, no deciduoma is formed. It sometimes happens, however, that a deciduoma appears when there has not previously been any mole, not even a partial one. Such a deciduoma owes its origin to a placenta, normal in other respects, but containing some epithelial cells with an abnormal tendency to proliferation. Finally, in exceptional cases, tumours described as deciduoma may be true sarcomata of the mucosa or muscular tissue of the uterus, and quite independent of pregnancy.

PUERPERAL TETANUS.

SIEBOURG, Barmen (*Monatschr. f. Geburtsh. u. Gynaek.*, Berlin, Bd. xii. Heft 3), reports the case of a multipara who had severe post-partum hæmorrhage due to atony of the uterus. Massage and injections of ergot were tried without avail, but the hæmorrhage was eventually stopped by clearing the uterus of clots, and irrigating it with lysol.

The patient suffered from profound anæmia, which was treated by subcutaneous injections of camphor normal salt solution. She had a rise of temperature on the sixth day, when stiffness began in the muscles of the neck and jaw, which was followed by pronounced tetanus, and she died on the following day. The source of infection was not discovered.

FÆCAL TUMOUR.

POTEN (*Centralbl. f. Gynäk.*, Leipzig, No. 33) reports the case of a young girl who complained of considerable abdominal pain. On examination a large abdominal tumour of doubtful nature was found. It was at first thought to be either a dermoid cyst or a uterine fibroid. Careful examination revealed the fact that depressions could be made in it by the finger, and consequently the diagnosis of a fæcal tumour was made, and was confirmed by the fact that the patient was completely cured after repeated enemata.

RUPTURE OF THE SYMPHYSIS PUBIS DURING PARTURITION.

G. A. HIMMELSBACH (*Phila. Med. Journ.*, October 13, 1900) reports a case of the comparatively rare condition of rupture of the symphysis pubis during labour. The patient was a primipara, æt. 25. Labour began at 10 A.M., and the child was born at 3.20 P.M. The presentation was normal, and though measurements were not taken, the bony pelvis seemed ample. The following day the patient had difficulty in turning in bed, and complained of soreness in the pubic region and in the right hip posteriorly, and said that she heard a loud snap when she attempted to turn on her side, which was accompanied by pain. On examination, the pubic bones were found to be separated at the symphysis, the bones gliding on each other. There was also swelling and ecchymosis over the right sacro-iliac joint, but no motion.

The patient was kept on her back for twenty-four days with a broad bandage extending from below the breasts to one-third way down the thighs. There was no disturbance of the bladder function. Two months elapsed before she could walk, but in five months she walked well and evenly, and only complained of pain at intervals. Pawin thinks that this accident is preceded by a physiological softening of the articular surfaces causing relaxation of the joint. Osteo-malacia may also be a predisposing cause. The lesion has been ascribed to undue size and solidity of the foetal head, to unfavourable presentations and forceps. There is no anatomical reason why one sacro-iliac joint should be more susceptible to rupture than the other, but experience shows that the accident usually involves the pubic symphysis first and next the right sacro-iliac joint. It is probable that a certain degree of relaxation of the symphysis occurs in many pregnant women, the ligaments losing their resilient qualities while the synovia is increased and presses the bones asunder. The pelvis thus becomes incapable of sustaining the body, and gradually yields to the weight above, or some slight movement precipitates the rupture.

THERAPEUTICS.

 UNDER THE CHARGE OF

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ACETOPYRIN.

THIS new salicyl preparation is a compound of antipyrine and salicylic acid. It is a crystalline powder, which is rather insoluble in water. It is not acted on by the acid gastric juice, but, in the presence of the alkaline juices of the intestine, it readily splits up into its component parts. It is claimed that gastric disturbance and most of the unpleasant effects of salicylic acid are avoided, owing to these properties. Winterberg gave the drug a thorough trial in more than a hundred cases. In forty cases of acute rheumatism the results were very satisfactory. Several of them had been under salicylate treatment outside, but had been recommended to the hospital on account of unpleasant symptoms, due to intolerance of the drug. It was found possible to keep these patients under the action of salicylic acid, by the use of acetopyrin, without causing the reappearance of these symptoms. This was very markedly shown in one of the early cases, where the supply of acetopyrin ran out, and the patient had to be put on salipyrin, which immediately caused toxic symptoms, but on obtaining a fresh supply of acetopyrin the patient was able to complete the cure without any further bother. Several similar cases are related. The author claims that in acetopyrin we have a preparation which has the beneficial action without the disadvantages of salicylic acid. Reduction of temperature, though very marked, was not attended by collapse. The sweating proved very profuse, and renders it not a good drug to employ in phthisis. The drug proved a reliable anti-neuralgic remedy in twenty-five cases of neuralgia, migraine, sciatica, etc. The temperature is rapidly reduced after a short rise. It commences to fall at the end of the first hour, remains down for two to three hours, and then gradually rises again. Owing to the gradual nature of the fall, the patient is not collapsed, and feels comfortable. The authors never noted any deleterious effect on the heart, or albuminuria or glycosuria. As a rule the dose employed was 7.5 grs., six times a day, given in capsules or sugar water.—Winterberg, *Wien. klin. Wchnschr.*, 1900, No. 39.

PHOSPHORUS IN THE DIET.

GEVAERTS points out that, despite the immense amount of work done on this subject, the results are very fragmentary, owing to the use of inaccurate tests and faulty technique. Thus all the work done to show that the phosphorus metabolism is increased during mental and bodily exertion, is rendered useless by the fact that the amount of phosphorus being taken in the diet had not been previously determined. Then the uranium acetate test is not accurate for determining small quantities,

owing to the presence of reducing agents in the urine. The incineration method, followed by precipitation with ammonium molybdate, requires the presence of a saturated solution of nitrate of ammonium. Practically all that has been established is that in ordinary health there is an intimate relationship between the intake and output of phosphorus. The author tried to solve the problem by putting animals on a diet sufficient in other elements, but containing no phosphorus. The investigation was rendered very difficult by the fact that phosphorus enters into almost all foods. The only carbohydrate in common use which does not contain it is white sugar. All fats contain it, and the only albumin compound which does not contain it is edestine. The experiments had therefore to be carried out on rats, which alone could live on a diet of sugar and edestine. Even they rapidly tired of edestine, and it was impossible to keep them more than five to eight days without losing flesh. If an animal be completely starved, the phosphorus excretion soon becomes very small after the diet phosphorus is excreted. Gevaerts estimates this vital loss of phosphorus as less than one-tenth that of nitrogen. If the animal be put on a sufficient diet, but not containing phosphorus, the phosphorus loss is diminished to one-tenth that of the starvation period. The author thinks that there can never be a deficiency in the intake of phosphorus, as our food contains it in so many forms, both organic and inorganic. Of the phosphorus excreted, nine-tenths comes from the food, and does not enter into the tissues but merely circulates through them. In the presence of such an excess of food phosphorus it is impossible to determine whether bodily or mental work causes phosphorus waste. He thinks that when, owing to tissue metabolism, the organic phosphorus in the tissues is set free, its ultimate fate differs from that of nitrogen and carbon, which are eliminated from the body. The phosphorus does not seem to be eliminated to a large extent. Probably after reaching the form of phosphate it again becomes built up into organic phosphorus compounds, like lecithin and nuclein. We know that excess of lecithin and nuclein appears ultimately in the excretions, in the form of phosphates. In favour of the synthesis view is the well-known fact, that for the first few days of life infants do not eliminate all the phosphorus which they obtain in their food. Over 89 per cent. of the phosphorus is thus retained, and as 25 per cent. of the phosphorus in milk is in the form of inorganic phosphates, the inorganic phosphorus must enter into the tissues. The author thinks that as medicines the phosphates, including glycono-phosphates, are unnecessary. As regards rickets and osteomalacia, it becomes more and more probable that a deficiency of phosphorus is not the original cause, but that they are probably primarily due to insufficiency in the nitrogenous elements, which always precedes phosphorus insufficiency.—*La Cellule*, Louvaine, 18th January 1901.

A NEW HYPNOTIC.

HEDONAL is the name given to the new preparation. It belongs to the urethane group. It is the result of the efforts to improve on ethyl-urethane by the substitution of a more active radical for the ethyl radical. The chemical formation of hedonal is indicated by the name, methyl-

propyl-carbinol-urethane. Former communications by various observers have shown that hedonal is harmless in therapeutic doses. Müller's experiments were carried out on lunatics, and also on seven healthy persons, in order to obtain accurate accounts of any unpleasant effects which might arise. The experiments seem to have been carefully carried out, and as far as possible the influence of mere suggestion was eliminated by suitable precautions. The preparation is very insoluble, and has an unpleasant taste; hence it is best given in the form of a powder or in capsules. It is soluble in alcohol. In many cases continued use of the drug caused nausea. The active dose of hedonal seems to be about 30 to 45 grs. Four healthy persons, who were not at the time suffering from sleeplessness, report that after taking 30 to 40 grs., in less than half an hour a strong desire for sleep occurs, but this can be overcome without any special effort, and passes off in about an hour. The hypnotic action is slight, and lasts only for a short time. In the cases of sleeplessness the author did not find the drug a great success. He finds that in doses of 30 to 45 grs. hedonal is an apparently harmless hypnotic, which acts in mild cases, and especially where what is required is subjective rest, as the sleep impulse is delayed or removed by mental excitement of a moderate degree. Even in successful cases the drug is not quite reliable, as the patient becomes quickly accustomed to the action, and the dose requires to be raised, and even then is uncertain. In severe cases of insomnia the drug is quite unreliable, even with large doses. Unpleasant effects, both subjective and objective, occur, but do not seem to be harmful, and only in the case of special idiosyncrasy is it necessary to stop the drug. In such cases there is marked diuresis and various unpleasant subjective symptoms, which however, after stopping the drug, rapidly pass off without leaving any traces. Contrasted with paraldehyde, Müller finds the new drug in every way inferior. It is dearer, less efficacious, more difficult to administer, and has more unpleasant after-effects.—Müller, *München. med. Wchnschr.*, 1901, No. 10.

— THERAPEUTIC USES OF THYROID EXTRACT.

MURRAY reviews the whole subject of thyroid medication. The chief use is in conditions due to destructive disease of the gland, with diminution or cessation of its secretory functions. The use of the B.P. preparations is advocated. The relative potency is 6 minims of liq. thyroidei = 1 gr. of thyroideum siccum, these quantities representing one-eighth of a lobe of fresh sheep's thyroid. The conditions in which thyroid treatment is based on physiological principles are myxœdema, cretinism, and parenchymatous goitre. Advanced cases of myxœdema are now rarely seen, but slight myxœdema is frequently the cause of ill health in women between 30 and 50 years of age, which yields to 10 minims of the liquor at bedtime, given for three or four weeks. In marked myxœdema there are two stages—treatment of the disease and then the maintenance of this healthy condition. During the first stage, confinement indoors, if necessary in bed, is advantageous. Small doses should be employed, and gradually raised. During the second stage it is necessary to give an amount of thyroid equal to the daily output of a healthy thyroid gland. Usually 1 drgm. of the liquor, given in six

daily doses of 10 minims, is sufficient for the week. This needs to be kept up as long as the patient lives. Murray never requires to give more than 10 minims, and in some cases, where presumably the gland is not entirely destroyed, 5 or 7 minims proves a satisfactory permanent daily dose. In cretinism the earlier the treatment is begun the better. Small doses are necessary in young cretins, 1 minim of the liquor every night, gradually increasing by 1 minim every week, till 5 minims is reached. Too large doses cause diarrhoea and vomiting. The permanent dose varies with age. One minim of the liquor for each year of life up to the age of 12 is an average dose. The physical improvement is much more rapid and marked than the mental. In goitre of the simple parenchymatous type, where the enlargement is due to hypertrophy, to meet the increased demand for secretion, thyroid treatment, by relieving the strain on the gland, leads to a partial atrophy. The diminution in size is gradual, and in some cases a tendency to relapse has been noted after stopping the treatment. In the majority of cases, a reduction to two-thirds, one-half, or even one-third of the former size, can be accomplished, which usually relieves all subjective symptoms. Thyroidism is very easily produced in myxœdematous cases. The earliest symptoms are fast pulse, palpitation, slight tremor, and, if continued, emaciation, diarrhoea, restlessness, insomnia; even symptoms of exophthalmos may occur. In exophthalmic goitre thyroid is contra-indicated, and chief reliance should be put on a quiet, well-regulated mode of life, with avoidance of all excitement. Thymus gland is occasionally useful, and the bromides, red iodide of mercury, belladonna, and arsenic may be tried. In diseases of the skin it seems generally allowed that, though a useful alternative, no better results are obtained by thyroid than by ordinary means of treatment. Occasionally the results are very brilliant. As regards obesity, thyroid extract is useful as an adjunct to dieting, though without suitable dieting its efficacy is questionable. In insanity due to myxœdema, or to thyroid disease, the treatment is very useful, while in other forms of insanity the results are very encouraging. Beatson's method of treating inoperable mammary cancer by oöphorectomy and thyroid medication seems to give benefit in about 20 per cent. of the cases.—*Practitioner*, London, April 1900.

ANTISEPTIC INHALATIONS IN PHTHISIS.

In several years, in cases of pulmonary tuberculosis, Maggiorani has employed inhalations which contain iodine. The object of treatment is to lessen the virulence of the bacilli and aid the expulsion of the toxins. The antiseptic inhalation contains iodine, formaldehyde, and peppermint, with sufficient chloroform to act as a sedative and remove the irritating effect of the formalin on the mucous membrane. A special inhaler is used, and the inhalations are continued for four hours at a time. The bacilli gradually diminish in the spit, and in some cases are absent after thirty to forty days' treatment. The destructive influence of the vapour on the bacilli was shown by injecting the spit into rabbits, when no tuberculosis resulted. After the bacilli are removed, there is slight spit, which may act favourably by removing toxine. It is necessary to keep up the inhalation for two or three months after the spit becomes free from bacilli. The cure seems to be fairly permanent, as several cases

have not relapsed in four or five years. General tonic treatment is aided by electric fomentations and general electric baths, which seem to have a powerful stimulating action on the various organs.—*Rev. internat. de Thérap. phys.*, Rome, Dec 1, 1900.

PATHOLOGY AND BACTERIOLOGY.

UNDER THE CHARGE OF

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OBSERVATIONS ON THE BLOOD IN TYPHOID FEVER.

THAYER (*Johns Hopkins Hosp. Reports*, Baltimore, 1900, vol. viii. p. 487) gives an analysis of the examination of the blood in typhoid fever, made in the Johns Hopkins Hospital during eleven years. The observations were not made by himself, but even allowing for the variability incidental to the work of different assistants, the results are both valuable and instructive. He deals with the blood in uncomplicated typhoid fever, and then in its various complications, such as hæmorrhage, phlebitis, thrombosis, pleurisy, pneumonia, periostitis, cystitis, and a host of others. In the first division he begins by *an analysis of the counts of the red blood corpuscles made during the course of typhoid fever, and in the first weeks of convalescence*. Great variations in the red blood counts occur during the disease, largely owing to actual condensation of the blood, following profuse sweating, diarrhœa, or vomiting. Thus, in the first week, the highest count was 6,940,000, and the lowest, 3,400,000; in the fourth week the highest, 5,884,000, and the lowest, 1,426,000; in the ninth week the highest, 4,288,000, and the lowest, 2,314,000.

The following general conclusions may be true in whole or in part :—

- (1) A diminution in the number of red cells occurs shortly after the onset of the fever.
- (2) This diminution increases gradually throughout the course of the disease, but may be accentuated during the fourth week. It is greatest at about the end of defervescence.
- (3) In cases of short duration, the diminution may continue into the first week of convalescence.
- (4) In longer cases, with mild persistent fever, it is not uncommon for regeneration of the blood to begin well before the end of defervescence.
- (5) The average maximum loss of red blood corpuscles is about 1,000,000 to the c.mm.
- (6) Considerable transient elevations in the number of red blood corpuscles per c.mm. may follow diarrhœa, vomiting, or sweating.
- (7) Sudden losses of a greater or less extent may be caused by hæmorrhage from the bowels.
- (8) Where the loss after hæmorrhage is severe, a certain amount of regeneration may occur during the course of the disease. In cases of long duration, however, there may be a subsequent fall.

He next made *an analysis of the estimates of the hæmoglobin during the course of the fever and in the first weeks of convalescence*, and concludes—The percentage of hæmoglobin pursues a course similar ap-

parently to that of the red blood corpuscles, but in cases where the anæmia has been appreciable, the return to normal is more gradual than that of the red blood cells. Then follows *an analysis of the counts of the colourless corpuscles made during the course of the fever and in the first weeks of convalescence*. His results are—(1) The number of the colourless corpuscles in the peripheral circulation is subnormal throughout the course of the fever. (2) The diminution is progressive with the increase in the severity and duration of the disease. (3) The average number of the leucocytes per c.mm., at the height of the disease, is about 5000. Much lower figures are common. (4) In cases with persistent fever there may be a slight increase in the later weeks of the disease. (5) The normal limits of variation of the number in different cases are considerable, but an increase to above 10,000 per c.mm. is usually an indication of some foreign influence (cold baths, inflammatory complications, hæmorrhage, etc.). (6) Cold baths cause an immediate transient increase in the number of leucocytes in the peripheral circulation, to three or four times the number present before the bath. Lastly, he gives *an analysis of the differential counts of the leucocytes during the same periods*, and finds—(1) The percentage of small mononuclear leucocytes is at first unchanged, but becomes distinctly increased at the height and toward the latter part of the disease, as well as in the first weeks of convalescence. (2) This increase is not so marked in the typical lymphocytes as in small forms with palely staining nuclei and a relatively large amount of transparent protoplasm. (3) The relative percentage of the large mononuclear leucocytes increases progressively with the course of the disease, the elevation continuing well into convalescence. (4) The increase of the largest varieties and of the transitional (lobulated nuclei) forms is generally not marked. (5) The cells most increased in number are about the size of polymorphonuclear leucocytes with pale nuclei, often scarcely larger than those of lymphocytes and transparent or palely staining protoplasm. (6) The percentage of polymorphonuclear neutrophiles diminishes progressively throughout the course of the disease, the diminution keeping pace with the increase in large mononuclear forms. The average of eight counts for the fifth week was 61·7 per cent.; of three for the sixth week, 59·2 per cent., and the limits of variation are considerable. Counts below 50 per cent. are not uncommon. (7) The percentage of eosinophile cells is diminished, the average throughout the course of the disease being under 1 per cent. (8) With convalescence the average of eosinophiles increases sometimes to a point rather above the normal average. (9) In long-continued cases with persistent fever, where regeneration of the blood sets in before complete defervescence, the percentage of eosinophiles may increase to the normal average, or above this, before the end of the febrile period. (10) In the leucocytes following cold baths the relative proportions of the different varieties of colourless cells are unaffected. The second part of the paper is devoted to the *blood changes*, especially the leucocytic ones, which occurred in *about eighty-five cases of typhoid fever, complicated by various other diseases*, and the results may be summed up thus—(1) Inflammatory complications of typhoid fever are associated with an increase in the number of leucocytes, similar to that occurring under ordinary circumstances. (2) The most extensive leuco-

cytoses were observed in connection with large abscesses, phlebitis, peritonitis, pleurisy, pneumonia, periostitis, cystitis, cholecystitis. (3) The extent of the leucocytosis appears to depend more on the nature of the local lesion than upon its specific causal microbe. (4) In some cases in which the complication is associated with a particularly malignant infection, especially if the patient's vitality be low, the leucocyte count may be actually diminished. In other similar conditions a slight increase may be followed by a subsequent diminution. (5) Hæmorrhage from the bowels may be followed by an increase in the number of leucocytes, which begins immediately after the hæmorrhage, reaching its maximum inside of twenty-four hours. Within a week the number of leucocytes generally returns to about the normal average for the period of the disease. (6) Perforation of the bowel is usually followed in a few hours by an increase in the number of the leucocytes, which may be considerable (above 15,000) or slight (under 10,000), and appreciable only in comparison with previous counts. The diminution may disappear with the aggravation of the symptoms. Sometimes there is a complete absence of leucocytosis or even a leucopenia after perforation. (7) The absence or disappearance of a leucocytosis, following a perforation, is an indication of the malignity of the infection, or the prostration of the patient. (8) The prospect of relief by surgical interference is best in those cases with a leucocytosis. (9) A pre-perforative leucocytosis, due to local peritonitis about deep ulcers, may occur. (10) In the leucocytoses associated with the inflammatory complications of typhoid fever, especially if these occur late in the course of the disease, or during the early weeks of convalescence, the relative proportions of the different varieties may show well-marked variations, which consist in a tendency towards the figures characteristic of typhoid fever, namely, a diminution in the percentage of the polymorphonuclear neutrophiles, associated with an increase in that of the large mononuclear forms; thus, with over 20,000 leucocytes per c.mm., there may yet be under 70 per cent. polymorphonuclear neutrophiles.

ON THE RELATION OF THE BONE MARROW TO LEUCOCYTE PRODUCTION AND LEUCOCYTOSIS.

MUIR (*Journ. Path. and Bacteriol.*, Edin. and London, 1901, vol. vii. p. 161) records the results of a number of experiments on rabbits, and observations on the human subject, undertaken with a view to determine the source of the leucocytes formed in great excess in certain pathological conditions. Pure cultures of *Staphylococcus pyogenes aureus* of a somewhat low degree of virulence were injected, sometimes into the peritoneum and sometimes into the subcutaneous tissue. The individual experiments are detailed, and the results of the blood examinations which were made from time to time are given in tabular form. They fall into two main groups. In the first there was little or no disturbance of the general health, so that the changes are chiefly of a formative nature. In the second, the general health suffered, generally severely, the changes being of a degenerative nature, produced by toxic action. He summarises the blood changes as follows—(1) Leucopenia appeared after the injections, all the varieties of leucocytes being affected. The

amphophile leucocytes are the first to increase subsequently, and thus may show a percentage increase, while the total leucocyte count is still below normal. (2) Amphophile leucocytosis is well marked on the following day, but may not reach its maximum till later. These results agree with those of Goldscheider and Jacob, and their earlier occurrence in Sherrington's experiments on dogs is probably due to the rapidity of production and to the extent of the local lesion. (3) An increase of the hyaline leucocytes was often observed at a later stage. A similar phenomenon has been observed by Turk and Bieganski towards the end of leucocytosis in acute pneumonia. (4) Myelocytes and nucleated red corpuscles were observed in severe toxic or septicæmic conditions. (5) Eosinophiles were diminished in number during the leucocytosis. These experiments, therefore, show two chief conditions—a drain on the finely granular leucocytes, and an increased supply of these cells, and also a varying degree of toxic action, thus showing active or formative changes on the one hand, and passive or degenerative changes on the other. The proliferative changes are seen in the bone marrow, and consist in a great, sometimes enormous, increase in the finely granular myelocytes, with corresponding absorption of the fat tissue. Active mitotic division was observed in these cells, and their increase must be regarded as making provision for the increased supply of finely granular leucocytes. There is no great increase of finely granular polymorphonuclear leucocytes in the marrow, the great increase being in the mother cells from which they spring, and a smaller increase in the intermediate forms. Comparing these changes in the marrow with those which occur after hæmorrhage, it is suggested that the marrow has two chief functions, namely, the production of red corpuscles and of finely granular leucocytes. Either of these functions may be called into greater activity, and the marrow correspondingly altered; the former he calls erythroblastic and the latter leucoblastic type of marrow. In the severe toxic conditions he found the following degenerative changes in the marrow:—(1) Degenerative changes (great) in the giant cells; (2) degenerations to a less extent in the finely granular myelocytes; (3) diminution in the number of polymorphonuclear leucocytes; (4) increased amount of blood; (5) passage of myelocytes and erythroblasts into the blood stream. With regard to the spleen, no change was found in it, to indicate that it played an active part in the increased leucocyte supply. Its chief function seems to be to remove any abnormal element from the blood, and suggests the view that in leukæmia the splenic enlargement is quite a secondary phenomenon. Chemiotaxis is the all-important agent in the production of leucocytosis. The rapidly occurring leucocytosis, after the injection of various chemical substances, is due to the finely granular leucocytes passing from the marrow into the blood. In inflammatory leucocytosis there is a corresponding condition. The toxins produce local emigration. If the area be small there may be no blood leucocytosis, but if it be extensive there is toxine absorption into the blood which induces passage of the leucocytes from the bone marrow into the blood stream. Toxic and inflammatory leucocytosis are therefore the same in essence.

THE RAPID DIAGNOSIS OF RABIES.

RAVENAL and McCarthy (*Univ. Med. Mag.*, Phila., Jan. 1901, p. 766) lay stress upon the capsular and cellular changes found in the inter-vertebral ganglia. They consist in the atrophy, the invasion, and the destruction of the nerve cells, brought about by newly formed cells derived from the capsule, which appear between the cell body and its endothelial capsule. These new-formed cells increase in number, invade the protoplasm of the nerve cell, and finally completely occupy the entire capsule. The changes are widespread, but few capsules remain unaffected, and in advanced cases the section has very much the appearance of an alveolar sarcoma. Taken in connection with the clinical manifestations, they afford a rapid and trustworthy means of diagnosis of rabies. The ganglia may be fixed, hardened, embedded, stained, and examined in little more than twenty-four hours. Where these changes are not present, it does not follow that rabies is not present. The lesions afford contributory evidence, depending on the duration of the clinical manifestations. In certain cases, where the capsular changes are slight, such as in animals dying in the early stages of the disease, the changes are more marked in the distal-peripheral end of the ganglion. The rabid tubercle of Babes is present sufficiently often to furnish valuable assistance in cases where only the cerebral nervous system is obtainable without any of the ganglia, but, in cases where the ganglia can be had, they offer a simpler and easier method of diagnosis than do the brain or cord themselves.

EXPERIMENTAL PANCREATITIS.

FLEXNER (*Univ. Med. Mag.*, Phila., January 1901, p. 780) gives the results of a number of experiments which demonstrate that a considerable variety of injurious substances, injected into the duct or through the capsule of the pancreas, may set up an acute pancreatitis. The one which develops most quickly and causes most rapidly fatal results is the hæmorrhagic form. Bacteria are not essential for its production, although they or their toxins may cause it. Suppurative pancreatitis is due to bacteria, and may go on independently of or be associated with hæmorrhage. The gangrenous forms of pancreatitis are always due to secondary invasion of putrefactive organisms. The relation between hæmorrhage and necrosis is still unsettled. His experiments favour the view that very extensive hæmorrhages may occur without the appearance of any necrosis in the pancreatitic tissue; and, further, that marked hæmorrhages may take place even when no gross or microscopic closure by thrombi of blood vessels is demonstrable. It would thus appear that both the hæmorrhage and the necrosis are the results of the simultaneous action of the injurious agent upon the blood vessels and upon the tissues. The part played by thrombosis is still an undecided question. His experiments also throw light upon the chronic forms of pancreatitis, the irritant setting up a slower form of inflammation associated with sclerosis. Bacteria, acids, etc., give rise to fat necrosis, not because they themselves act on the fats, but by causing disturbances in the pancreas, and liberating the fat-splitting ferment which causes

the decomposition of the fatty molecule. Similar lesions in the extra-peritoneal fatty tissue are also not of bacterial origin, but are due to the action of the fat-splitting ferment.

PSAMMOMA.

ENGERT (*Virchow's Archiv*, 1900, Bd. clx. S. 19) shows that psammoma, like tumours, are very common upon the inner surface of the dura mater. An examination of a large number of dura maters resulted in his finding psammoma-like growths in every fifth or sixth case. In this way he collected twenty-five tumours, varying in size from a pin's head to a bean. They are most frequent upon the convexity. Histologically, they varied very much, from fibrous growths, like fibromas, to cellular growths, like sarcomas; but in all cases they were arranged around a central blood vessel, and this explained their tendency to calcification. He thinks the absence of a blood vessel in the centre of some of the calcified foci to be due to the central blood vessels having been very rudimentary, and to have sprung as a bud from another branch, and failed to develop a lumen.

DISEASES OF THE EAR, NOSE, AND THROAT.

UNDER THE CHARGE OF

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ABSCESS OF THE BRAIN, CONSEQUENT UPON DISEASE OF THE MIDDLE EAR.

An interesting and valuable summary of the symptoms and signs of brain abscess, arising in connection with middle ear suppuration, has recently been given to us by Hammerschlag of Vienna (*Monatschr. f. Ohrenh.*, Wiesbaden, January 1901). This author has based his conclusions upon those cases in which the brain abscess was diagnosed during life, and in which an operation was performed for its relief. The total number of cases reported in literature at the date of Hammerschlag's publication is 195. Of these, 142 had already been collected by Röpke (*Ztschr. f. Ohrenh.*, Wiesbaden, 1898, S. 95), while the remaining fifty-three are collected from the literature of the past three years by the author. The deductions which the latter draws are based upon the grand total of 195.

The many points of interest which this subject offers to the reader may be taken up under the following headings, and briefly reviewed:—

1. *Period of life.*—Cerebral abscess of otitic origin occurs most frequently in early middle life. The statistics of Körner, Röpke, and Hammerschlag sufficiently indicate this. The figures compiled by

the last named may be quoted here. In children under 10 years he records twenty-seven cases; from the eleventh to the twentieth year of life, forty-seven cases; and from 21 to the age of 30, fifty-one cases. After 30 there is a marked falling off in the number of cases of cerebral abscess, only twenty-two being recorded in the decade between 30 and 40, while from 40 years upwards the same number is reported. These figures furnish additional proof in support of a point which we have more than once referred to in our reviews, namely, that the dangerous period of life in connection with chronic middle ear suppuration is passed before the majority of individuals apply for life insurance.

2. *Sex*.—As regards the relative frequency with which temporo-sphenoidal abscess occurs in the two sexes, it was found that out of 175 cases, in which the sex of the patient was stated, 122 were males, while 53 were females, thus showing a considerable preponderance in favour of the former.

3. *Right or left side of brain*.—In 181 cases of temporo-sphenoidal abscess, eighty-five occurred in the right hemisphere, and ninety-six in the left. The difference is not a striking one. It must not be forgotten that these statistics are based upon cases which were operated upon, that is to say, the cerebral complication was recognised and dealt with. The train of symptoms associated with an abscess in the left lobe permits of a more ready diagnosis, and consequently operation is more frequently undertaken on the left side.

4. *Etiology*.—The association of cerebral abscess with a chronic middle ear suppuration hardly requires any comment. The possibility of a similar complication arising in connection with acute middle ear suppuration is not always taken sufficiently into account. In Hammer-schlag's observations we find that cerebral abscess complicated chronic suppuration 149 times, acute suppuration 37 times, and subacute suppuration in one case. In other words, in 25·3 per cent., or one quarter of the cases, acute suppurative otitis was the etiological factor in the production of temporo-sphenoidal abscess. This fact receives additional importance, if we examine the relative fatality of the complication arising in the two groups of cases. In seventy-eight of the cases which occurred in a chronic suppuration there was a fatal result, that is in 52·4 per cent.; while twenty-three, or 62 per cent., proved fatal, arising in the course of an acute suppuration. One must be careful, however, not to attach too much importance to the significance of these figures.

5. *Symptomatology*.—Owing to the difficulty which is experienced in obtaining a complete history in many of these cases, the information regarding the onset and progress of the illness is often very deficient. It is necessary to differentiate between the general symptoms and the brain symptoms themselves, and to consider in the first instance the *variations in the temperature*. In otitic brain abscess there is no characteristic temperature line. In a number of cases the complication progresses with the temperature, normal or subnormal, while in others again there is a slight or even a considerable rise. In many of these cases the cerebral abscess is complicated by such conditions as meningitis or sinus phlebitis, and the fever is due to the latter affections. One must separate the uncomplicated from the complicated brain abscess before any deductions can be drawn as to the temperature in brain abscess. In

Hammerschlag's statistics the temperature was noted in 170 cases; of these, it was normal in 46, elevated in 106, and subnormal in 18. If we examine into the 106 cases in which there was fever, we find that in thirty-five some other cerebral complication was associated with the brain abscess, while in six it was not advisable, or indeed possible, to draw any deduction with regard to the intracranial condition. In this way forty-one cases are, so to speak, grouped together. There remain sixty-five cases in which there was elevation of temperature with apparently brain abscess alone. It is necessary to qualify this statement with the word apparently, as in a very small number of the cases in this group it was possible that there might have been some other complication in the neighbourhood of the sigmoid sinus. Lastly, as stated above, there were eighteen cases in which the temperature was subnormal. Consequently it follows that in rather more than half of the cases of uncomplicated brain abscess the temperature is raised, a state of affairs which differs from the earlier teaching upon this important clinical point. Rigors do not appear to be frequently noted. In only six uncomplicated cases was this symptom observed.

6. *General cerebral symptoms.*—The most frequent of these is *headache*. The statistics show its presence in 103 cases. Stiffness of the neck was noted twelve times, and general convulsions in ten patients. While no diagnostic value can be attached to a general headache, localised headache and tenderness are of fairly good diagnostic importance. Its value, however, is greatly interfered with, from the fact that it so seldom declares itself; in only twenty-eight cases was the headache complained of on the same side as the abscess, and in fourteen additional cases there was tenderness in the temporal region upon the same side. Its value, however, is lessened by the fact that in brain abscess local tenderness may be met with in the most diverse parts of the skull. *Disturbance in cerebation* occurred in 105 cases, or in more than one half. Mental symptoms were rare. The sensory disturbances ranged from the slightest form of slow cerebation to loss of consciousness and coma, which occurred in seventy-four cases. It is interesting to observe that even heavy stupor did not adversely influence operative procedure, as in twenty-four cases in which there was unconsciousness or coma, thirteen recovered after operation. The *pulse* was noted as slowed in seventy-three instances. *Eye symptoms*, varying in degree, were met with; in sixty cases changes in the fundus were noted.

7. *Localised cerebral symptoms.*—*Aphasia*, which is so characteristic of left-sided cerebral abscess, occurred fifty-three times in a total of ninety-six abscesses of the left temporo-sphenoidal lobe. Twice, however, a temporary aphasia was noted in a right-sided brain abscess, a point which does not diminish the diagnostic value of the symptom in abscess of the left hemisphere. *Hemianopsia* was met with six times. Motor disturbances on the opposite side, whether of the nature of paralyses or as unilateral convulsions, were noted in seventy cases.

8. *Prognosis*—Lastly, the following post-operative statistics are of interest. Out of 195 cases, 180 are suitable for drawing conclusions from in regard to results. Out of 106 cases in which the brain was explored through the squamous temporal, forty, or 37·7 per cent., recovered. Of sixty-four that were explored through the mastoid

region, thirty-one, or 48·4 per cent., recovered. Of ten cases in which the brain was exposed, both through the tegmen antri and through the squamous temporal, eight, or 80 per cent., recovered.

A FORM OF FAUCIAL INFLAMMATION RESEMBLING DIPHTHERIA.

ATTENTION has been recently drawn by Francis Villy (*Med. Chron.*, Manchester, September 1900) to the occasional occurrence of a faucial condition which closely resembles that due to the Klebs-Löffler bacillus. The resemblance may be still further strengthened by the fact that a profuse nasal discharge may also be present in these cases. The author reports four cases of this kind which have come under his own care. The affection differs from true diphtheria in the following respects, which may be thus summarised:—(1) The local faucial lesion is of a more gangrenous nature; in fact, the substance which resembles membrane consists for the greater part of slough; ulceration which is revealed by the separation of this slough is more constant and extensive than is usual in diphtheria. (2) The disease is of a more febrile nature, and delirium is not uncommon. (3) Paralysis is not one of the sequelæ. (4) Recovery, when it occurs, is more rapid, and cardiac affections are not in evidence. (5) The Klebs-Löffler bacillus, if found in the throat at all, is present only in small numbers, and is probably not a factor in the causation of lesion. (6) *Streptococcus pyogenes* is the preponderating organism found in the throat. (7) The disease is not at all affected by the administration of diphtheritic antitoxine.

It may be very difficult to recognise, from inspection of the throat, that the case under observation is not one of ordinary diphtheria. The writer, however, lays some stress on the presence of marked ulceration, after the throat has become clean. In one of his cases there was serious loss of substance, with continued deep erosion, leading to severe hæmorrhage. The ulceration in this case continued up to the twenty-third day. A deep gap existed in the site of the left tonsil, the ulceration extending into the posterior faucial pillar. A feature, however, of greater distinction, is found in the constitutional effects of the two conditions. There is a much greater and more lasting pyrexia, extending over a period of several days, and, in three of the four cases reported, delirium occurred in a well-marked form. In none of the cases was there any cardiac or other paralysis. Each of the patients received antitoxine, which in no way influenced the course of the disease.

In discussing the question of the bacteriology of the affection, the author states that cultivations were made three times from each; in two of the cases, diphtheria bacilli were found in small numbers on the third attempt, while in the remaining two they were never found. All were admitted into diphtheria wards, and remained exposed to the infection for some days. In all of them the preponderating growth in the cultures presented the characters of the *Streptococcus pyogenes*. The author, in his critical review of the cases, comments on the fact that the diphtheria bacillus is found in the throats of those who are suffering from other diseases, or perhaps from no disease at all; and, further, that the

organism is sometimes present in the throats of scarlet fever patients. Cultivations were made by Villy from the throats of ten of the nurses and ward maids in his hospital wards, and in five of these a single cultivation resulted in the discovery of a bacillus morphologically identical with the diphtheria bacillus. If an abundant cultivation of this bacillus be obtained from a throat, it is very strong evidence that the individual is suffering from diphtheria; if no bacillus is found, the evidence is equally strong against the existence of that disease; while if the bacilli are found with difficulty, and only in small numbers after several attempts, the probability is that the disease is not diphtheria.

In connection with the very interesting and important question of the morphological character and virulence of the diphtheria bacillus, we are led to refer to the discussion upon the bacteriological diagnosis of diphtheria, which was held in the Section of Pathology at the Ipswich meeting of the British Medical Association last year. The opening remarks of Dr. Andrewes are well worthy of consideration. Starting with the assumption that it is the presence or absence of the specific bacillus which must decide whether or not a given case is diphtheria, he considered the question as to what is or what is not a diphtheria bacillus. The so-called "diphtheroid organisms" have a tendency towards a clubbed form, and to an irregular staining of their protoplasm, due to the presence of granules; spore formation is unknown; they are devoid of flagella, and are non-motile; they stain by Gram's method, and do not liquefy gelatine. Diphtheria depends upon the pathogenic action of a bacillus possessing these characters, but there are allied bacilli which are non-pathogenic, and, owing to the fact that the genuine organism itself may resemble the non-pathogenic, morphological characters alone do not give a safe guide for diagnosis.

While the staining of the granules in the protoplasm by Neisser's method, and the production of acid in glucose broth, are differential tests to which considerable value may be attached for the recognition of the true form, animal experiment furnishes the surest proof. Even inoculation experiment, however, may be fallacious. If the guinea-pig dies, might not death be due to some diphtheroid organism unconnected with diphtheria? The practical difficulty in connection with inoculation arises, however, in relation to clinical diagnosis. The physician demands an early expression of opinion from the bacteriologist, and inoculation requires several days. What is the value of the bacteriologist's report minus the inoculation experiment? In the hands of a competent and experienced observer, the probability that such a report is correct may be very high, and more than enough to justify the practitioner in taking decisive action. But it must be only taken for what it is worth, as it does not have the value of certainty too often attributed to it. Virulent bacteria may be present in the throats of healthy persons who have been in contact with diphtheria. Bacilli closely resembling diphtheria bacilli may be abundant in the healthy nose. Some years ago, Dr. Andrewes carried out an investigation upon seventy consecutive cases of sore throats, of all kinds, occurring in nurses. The investigation was clinical and bacteriological, controlled by animal experiment. If the cases had been diagnosed on clinical grounds only, an error would have been made in one out of every nine

cases of apparently simple sore throat. The author makes an appeal to the clinician, that the bacteriologist should be furnished with some clinical facts concerning the suspected case, and that the source from which the material is taken should also be given. It is interesting to observe that he has found diphtheria bacilli in great abundance and in full virulence in the throat three months after the primary attack of diphtheria.

PUBLIC HEALTH.

UNDER THE CHARGE OF
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INDUSTRIAL HYGIENE.

Dangers to health among zinc smelters in Germany.—This is the subject of a report by Dr. Wutzdorff (*Arb. a. d. k. Gsndhsamte.*, Berlin, Bd. xvii. Heft 2). Zinc smelting is an important industry in Germany, where in 1889 more than 135,000 tons of metal were produced, giving occupation to nearly 9000 operatives. Silesia is its chief centre, where, in 1896, 7670 operators were employed, of whom 1670 were females. The operation consists in roasting the ore to convert it into oxide, and then reducing this to metal, by means of strongly heating with coal. The dangers to health arise from the gaseous effluvia—carbonic oxide and sulphurous anhydride, the fine dust from the ashes of the furnaces when these are emptied, and perhaps chiefly from the fumes of lead. Most zinc ores contain this metal, and the author found it present in quantity varying from 1 to 4 per cent.

Women and girls are employed chiefly in removing the ashes from the furnaces, and this operation is so disagreeable that they have to work with a woollen cloth over the mouth and nose. Lead poisoning is common among the work-people. In 1881 there were 220 cases in Silesia, and in the period 1879 to 1885 there were six deaths. Of these deaths, two were among women employed in removing furnace ashes. Zinc itself in the form of fumes does not seem to be very harmful.

The health of zinc smelters is soon affected. Anæmia, loss of appetite, and disturbance of digestion, the cause of which is indicated by the blue line on the gums, soon appear, and these are often followed by the more pronounced symptoms of lead poisoning. The workmen, as a rule, are unfit for work at 40 years of age. Among the women, disturbance of menstruation is very common, and there is a marked tendency to abortion.

Industrial lead poisoning.—Dr. T. W. Legge, H.M. Inspector of Factories, discusses this subject (*Journ. Hyg.*, Cambridge, vol. i. No. 1). By an enactment in the Factories and Workshops Act of 1895, the notification of every case of lead poisoning contracted in a workshop is

compulsory on the part of the medical attendant, and also on the occupier of the factory. From data thus gained, valuable information has been obtained.

The greatest cause of plumbism is the inhalation of dust from white lead during its manufacture, the use of white lead for glazing in china and earthenware works, etc., and in the grinding of white lead in the manufacture of paints and colours. But the slower and more insidious form of lead poisoning, brought about in the handling of metallic lead—*e.g.* in printing, file cutting, and plumbing, as well as by the absorption of salts of lead in the form of paint—seems more severe in the long run than that caused by salts of lead in the form of dust or from fumes. Taking zinc smelting as representing fumes, and tabulating the results, he finds that in every hundred cases of plumbism notified in each of the four divisions, the following is the number of severe cases:—Fumes, 17·3; dust, 24·6; metallic lead, 34·6; paint, 40·7.

Paretic symptoms were least common and digestive symptoms most common in cases due to inhalation of dust. The average age of those attacked and the average duration of employment prior to attack varies in the different industries. While among white lead workers about 46 per cent. of those attacked were under 30 years of age, only 23 per cent. of those among filemakers were under this age. 87 per cent. of those attacked among white lead workers had been employed for less than five years, while among filemakers none were attacked till after this term of employment. The slowness of the onset of symptoms among file workers and painters may produce a feeling of indifference to the gradual undermining of the constitution, while the sharp attacks of colic among white lead workers leads them to seek other employment. In white lead works there is a continuous influx of new hands.

Men continue to work in lead a much longer time than women. In 1898 the employment of women in the dangerous processes of white lead making was prohibited. Statistics do not lead to the conclusion that females are more susceptible to lead than males. No doubt the symptoms of headache and anæmia, and possibly encephalopathy, occur in women more frequently than in men. Lead palsy, however, is essentially an affection of the male sex, and the proportion of severe attacks is greater in males than in females. The influence of this class of industry on child-bearing is marked. Among seventy-seven married women, reported during 1897 as suffering from lead poisoning, the proportion of miscarriages to pregnancies was 1:2·3. Among 239 female workers in lead the proportion was 1:14, and among seventy-one of these who had no children prior to working in lead, and who had been ten years at this industry, the proportion was 1:9.

As regards prophylaxis, the author states: "While reliance has to be placed less on the use of respirators, every day sees improved conditions of work, brought about by the introduction of fans, so arranged as to catch the dust at the point where it is produced."

The use of lead in the manufacture of pottery.—Professor Thorpe's report to the Home Office, which has just appeared, is a continuation of the report on this subject which he prepared in conjunction with Dr. Oliver, and which was presented in 1899.

In 1898 there were 4703 persons returned as "working in the lead"

in the Potteries, 1580 of whom were females, and 3123 males, and during that year 348 cases of plumbism were reported, 196 among females, and 152 among males. Thus 4.9 per cent. of the total male workers were "leaded," while among females it was as high as 12.4 per cent. The reporters are convinced that females are more susceptible to plumbism than males. After the abolition of female labour in the dangerous departments of white lead manufacture, which took place in the later half of 1898, not only was the sex incidence of plumbism altered, but the severity of the cases was lessened. A large number of cases of plumbism are annually admitted to Newcastle Royal Infirmary. In 1896, thirteen males and twenty-five females were treated, and two females died; while in 1890 there were twenty-three males and thirteen females treated, all of whom recovered—though several of the males suffered severely. In the operation of glazing with lead, the lead has hitherto been as a rule in the "raw" state in the glaze, *i.e.* as carbonate of lead, red lead, litharge, or in the form of ground galena, according to the class of ware produced. Lead in the "raw" state is very soluble in weak acids, and it is to the use of this kind of glaze that most of the plumbism is traceable. By "fritting," that is fusing, the "raw" lead and other materials in the glaze along with silica and boric acid, the lead is made much less soluble in dilute acids. This insolubility depends on the ratio of the basic portion of the "fritt" taken as lead oxide to the acidic portion taken as silica. When this ratio is 1 : 1.45, 0.25 per cent. hydrochloric acid can extract practically no lead from the finely ground "fritt." A simple silicate of lead, containing about 70 per cent. lead oxide and 25 per cent. of silica, is nearly as soluble in weak acid as basic carbonate of lead itself.

There is often much more lead used in the glaze than is required. In some cases, where lead had been used quite recklessly, they found glazed ware so heavily laden with it, that vinegar and the acids of fruit could extract in a few hours a very appreciable quantity. Analyses of glazes taken from the dipping tubs showed the amount of lead oxide calculated on the dry material to vary between 13 per cent. and 24 per cent. In the interest of the public, the reporters think this should not exceed 12 per cent., and they suggest that, if a legislative limit be adopted, the factory inspectors should be empowered to take samples for analysis from the dipping tub, so as to ensure that the regulation is complied with. A great deal of glazing can be done perfectly with leadless glazes, composed of silica, alumina, boric acid, lime, etc., and these are of course quite harmless. On this subject they state: "We have no doubt whatever that leadless glazes of sufficient brilliancy, covering power, and durability, and adapted to all kinds of table, domestic, and sanitary ware, are now within the reach of the manufacturer," and that such ware would be produced if the public insisted upon it. In those branches of the pottery industry in which it would be more difficult to dispense with lead, the "fritted" double silicate should be used, and this would greatly diminish the evil of lead poisoning. The use of "raw" lead, either as an ingredient of glazing material or of colours which are to be subsequently fired, should be prohibited. Further, young persons and women should be excluded from employment as dippers, ware cleaners, and glost placers, where lead glaze is used.

Questions having arisen between the Home Office and the manufacturers in regard to the application of the above recommendations, especially as to the standard of solubility of the lead "fritt," Professor Thorpe has carried on further experiments on the relation between the composition of this substance and its solubility in dilute acids. He considers that the rule requiring that no "fritted" lead be used in glazing, which parts with more than 2 per cent. of lead oxide to 0.25 per cent. hydrochloric acid in one hour, is not too stringent, and should be retained. On the contrary, the limit of 2 per cent. was quite far enough in the way of leniency. If the limit be raised to 5 per cent., as had been suggested, then one-third of the lead in the ordinary glaze, as used at present, might be dissolved in dilute acids in an hour. Moreover, the stomach works hour after hour and at the temperature of the body.

Leadless glazed china and earthenware are now on the market; and even coloured and printed tiles, which are among the most heavily lead-coated articles made, are being produced without lead.

CASE OF ZINC POISONING DUE TO WEARING STOCKINGS.

DR. ADOLF JOLLES (*Allg. Wien. med. Ztg.*, Jahrg. xlv. No. 10) describes an interesting case. The patient, a young woman, had more than six months previously suffered from a motor and sensory affection of the lower limbs, which, however, gave way to treatment. The soles of her feet were stained yellow, and this staining had immediately preceded the onset of her illness. She suffered from hyperhidrosis of the feet, and the staining was attributed to the wearing of yellow silk stockings, but these were not at this time suspected as the cause of her symptoms. After recovery, she was for some months able to take long walks, but suddenly was again attacked with similar symptoms, but of a severer order—loss of co-ordination, paræsthesia, and severe pains in the lower extremities. Urine contained a large amount of albumose, albumin, some tube casts, and a relatively large amount of zinc. The patient recovered, but the zinc was slowly eliminated, it being found in the urine, in varying quantity, for two months. Chemical examination of the stockings showed that chloride of zinc had been used for giving body to the silk, and that the dye was one of the azo-bodies, which was not fast, but easily washed out by hot water.

The author points out that chloride of zinc is a frequently used means of giving body to silk, especially of light fashionable fabrics. The silk is steeped alternately in a solution of this salt and a weak soda solution. When repeated again and again, this causes a precipitation of hydrated oxide of zinc on the silk, to the extent of about 25 per cent. of its weight. He strongly urges that no silk material should be worn next the skin.

DIPHTHERIA BACILLUS IN CONVALESCENT CASES OF DIPHTHERIA.

A PROLONGED investigation on this subject, among patients in the Blegdam Hospital, Copenhagen, and among those that had been dis-

charged from it, has been made by Dr. Holger Prip (*Ztschr. f. Hyg. u. Infectiouskrankh.*, Leipzig, Bd. xxxvi. Heft 2).

Among 654 convalescent cases in the hospital, in only 309 was the bacillus found after the entire disappearance of the membrane. Among 107 of these, he observed that cultivations from the throat might give negative results for some days, and then the bacillus reappear. Since he observed the same thing in discharged cases, he did not think that this reappearance was due to re-infection. The following are his results:—

In 118 cases diphtheria bacillus present from 1 to 10 days after disappearance of membrane.

93	”	”	”	10 to 20	”	”	”
51	”	”	”	20 to 30	”	”	”
41	”	”	”	30 to 60	”	”	”
6	”	”	”	60 to 120	”	”	”

In all these cases, the use of disinfectants for the throat, by brushing, gargling, etc., was carefully made. The use of anti-diphtheritic serum had no effect on the persistence of the bacillus in the throat.

Among a hundred patients discharged from the hospital, he found the bacillus in sixty. He was only able to keep twelve of these under observation till the bacillus disappeared. In eight it continued more than one month, in one more than two months, and in three more than three months after disappearance of the membrane. Pure cultures were made from eight of the sixty cases, and found to be virulent, killing guinea-pigs with typical symptoms in twenty to sixty hours. These cultures were taken from cases from thirteen to 335 days after disappearance of the membrane.

As bearing on virulence of bacilli, he describes an interesting case. A girl (A) æt. 8 had a mild attack of diphtheria, and after two months in hospital was, at the request of her parents, sent home, though the bacillus was still present in the throat. A week after her return, a companion (B) living in the same tenement entered the hospital with a diphtheritic sore throat, though the bacillus was not found. Three days later, the sister of A, and fourteen days later the sister of B, were received into the hospital, suffering from diphtheria, in each of which the bacillus was found. A bacteriological examination of A's throat (now eighty-four days after disappearance of the membrane) showed the presence of virulent diphtheria bacillus.

REPORTS OF THE MEDICAL SOCIETIES.

GLASGOW MEDICO-CHIRURGICAL SOCIETY.—*April 5, 1901.*—Dr. T. K. MONRO and Dr. A. G. FAULDS showed a patient (middle-aged woman) with irregular, involuntary movements in the fingers and lower limb of the right side, apparently referable to a slight attack of hemiplegia. In the hand the movements involved chiefly the thumb, forefinger, and little finger; in the leg, the quadriceps extensor, the external rotators of the thigh, and the muscles of the calf. There was a little flatness on the right side of the face, and the tongue deviated to the right side. Dr. Monro was of opinion that the symptoms were due to atheroma of some of the cerebral vessels.—Dr. MONRO also read notes of a case of diabetes, in which threatened coma was averted under treatment by intravenous saline injections and purgation. At the time of admission to hospital, the patient, a young man *æt.* 21, was passing 200 oz. of urine, containing 6000 grs. of sugar. At the time of dismissal he was passing 65 oz. of urine, containing 1300 grs. of sugar.—Dr. NEWMAN showed a specimen from a case of malignant disease of the descending colon, successfully treated by operation. In the left side was felt a large mass, which proved to be a faecal accumulation. It disappeared after the bowels had been thoroughly moved with small doses of castor-oil. A small nodule, the size of a walnut, was still to be felt. The tumour was situated near the junction of the descending colon with the sigmoid. About 4 in. of bowel were removed, and the divided ends united by means of Murphy's button.—Dr. NEWMAN also gave an account of a case of malignant stricture of the upper end of the oesophagus, where gastrostomy was performed, and, at a later date, on account of pressure on the trachea, tracheotomy. The patient did not regain sufficient strength to allow of the removal of the tumour.—Dr. J. G. CONNAL read a short paper on "Furunculosis of the External Auditory Meatus."

GLASGOW PATHOLOGICAL AND CLINICAL SOCIETY.—*April 15, 1901.*—Mr. H. E. CLARK, President, in the chair.—The PRESIDENT showed a tuberculous kidney, which he had removed from a woman *æt.* 37. The patient's illness commenced suddenly, seven weeks previously, with a rigor, followed by sweating and pain in left lumbar region. The rigors and sweats continued, and she suffered from nausea. A swelling in the left lumbar region was observed three weeks before operation. On admission to hospital, there was a marked swelling in the left loin, with tenderness, especially posteriorly. Dulness on percussion extended up to level of seventh rib. There was some friction and diminished R.M. over base of left lung. Examination with Kelly's speculum failed to find the orifice of left ureter; that of the right was easily seen, and that ureter was catheterised. The urine from right

ureter was normal, while that passed per urethram was highly albuminous and purulent. The left kidney was removed, and at the operation a subphrenic abscess was discovered. There was no sign of any opening in the diaphragm communicating with pleural sac. The right kidney was functioning well, 40 oz. of urine being passed on fifth day after the operation. The kidney which was removed was little else than a collection of cavities containing pus and débris. The favourable points in the case were—(1) the utter uselessness of left, and (2) compensatory change in the right, kidney.—Dr. R. BARCLAY NESS showed three cases illustrating cerebral palsy. The first was of the nature of a cerebral diplegia, and was that of a child *æt.* 2½. The remaining two were chiefly characterised by spastic paraplegia, and were sisters, *æt.* 9½ and 10½ respectively. The question of difficult labour was investigated, and was answered in the negative; but the first case was born prematurely at the seventh month. He looked on the condition as of congenital origin, and did not think the prognosis was good. He did not look favourably on craniectomy in such cases.—Dr. M'GREGOR ROBERTSON gave—(a) Demonstration of Ehrlich's apparatus for fixing blood films by heat, and also specimens of blood films so fixed and stained with the triacid fluid; (b) Recent apparatus for the clinical determination of blood pressure—Oliver's arteriometer and hæmodynamometer, Basch's sphygmomanometer, Gärtner's table tonometer, also pocket tonometer, Hill and Barnard's sphygmometer (armlet and wristlet forms).—Dr. ALEC R. FERGUSON demonstrated a sarcomatous tumour, arising in connection with the posterior tibial nerve. The tumour was of the mixed-celled variety, and had arisen from neuroglia. It contained mucin in its meshes. It was largely cystic, and extended from the upper part of the calf down to the ankle. The nerve entered and emerged from the mass at upper and lower ends. The cysts contained blood and cell detritus. It had occurred in a woman *æt.* 22, had existed for six months, and the limb had been amputated above the knee for the condition by Sir Hector Cameron.

FORFARSHIRE MEDICAL ASSOCIATION.—Dundee, *April 5, 1901.*—Dr. HAVELOCK, President, in the chair.—Dr. GILRUTH gave a short account of some cases of smallpox, and showed a photograph of one of the cases. The relative severity of the symptoms and their relation to the time of vaccination in each case was discussed.—Dr. GILRUTH also showed radiographs of a severe case of rachitic curvature of tibia and fibula, from which he had removed wedges of bone with good result.—Professor MACEWAN showed a specimen of tumour of thigh removed from a woman *æt.* 25, the nature of which was as yet undiscovered. The history and characters of the tumour did not resemble those of sarcoma or myoma, and it was quite free from bone. There was no history of syphilis.—Professor MACEWAN also gave an account of three bladder cases. The first was a case of recurrent calculi in the bladder. The patient, a man, had been operated on three times; eight calculi were removed at the first operation, two nine months later, and three nine months later than that. Suprapubic lithotomy was performed twice, and lateral lithotomy the third time, as the cicatricial contraction resulting from the previous operations had drawn the peritoneum too far down to allow

a suprapubic to be performed. The second case was one of enlarged prostate, treated by double orcheotomy with marked improvement. Professor MacEwan reiterated the conclusions he had formed in his paper on this subject, read at the British Medical Meeting at Carlisle four years ago, and stated his further experience confirmed these. The third case discussed was that of a lad æt. 19, who had suffered from frequency of micturition. There was no stricture and no stone, but the cystoscope showed an ulcer of the bladder. This ulcer was scraped, and the bladder drained after median cystotomy. Six weeks after the operation, the patient was able to retain urine for six hours.—Professor MARSHALL then spoke on the advantages of heroin and dionin, their composition, and the manner in which they had been discovered. Heroin, he said, was similar to morphine in its effects, except in one important particular, namely, it was less depressant on the respiratory system. Dionin was less powerful than heroin, but more so than codeine.

OBITUARY.

WILLIAM JOHNSTON, M.D.

THE last of a distinguished line of medical men passed away on Easter Sunday, in the person of Dr. WILLIAM JOHNSTON. Born in 1828, at Stirling, where his father and grandfather had successively held distinguished positions as medical practitioners, William Johnston received his education at the Grammar School of his native town. On leaving school he entered the University of Edinburgh, and after graduating in 1849, proceeded to Paris, where he spent a year in further studies. In 1850 he settled down to practice in Stirling, and soon acquired an extensive connection, not only in his own county, but also in Clackmannan and southern Perthshire. For many years Dr. Johnston was Honorary Physician and Surgeon to the Royal Infirmary of Stirling, and as one of its Directors he had a large share in its general as well as in its medical management. He had the satisfaction of seeing the hospital grow from small beginnings to its present flourishing condition, and when he resigned his post a few months ago he had the pleasure of knowing that he handed the torch undimmed into the hands of zealous and capable men.

Dr. Johnston was one of the original members of the Volunteer force, in which for many years he held a commission as Surgeon. In this rank he was present at the great Reviews of 1860 and 1881. Besides his interest in the Infirmary and in his battalion, he manifested warm sympathy with every public movement, and was a staunch supporter of Church and State.

Throughout the Carse of Stirling and the surrounding district his death is deeply mourned, and very warm sympathy is felt for Mrs. Johnston.

ANALYTICAL REPORTS.

EFFERVESCENT SALT.

(The Abbey Effervescent Salt Co., Limited, London.)

ABBNEY's Effervescent Salt is a well-made granular white powder; the granules being small in size, and therefore readily and quickly active on addition of water, which forms a very palatable effervescing drink when dissolved in proper proportions in water. Its solutions are pleasantly saline, without any harshness, are clean to the taste, and can scarcely prove disagreeable even to the most fastidious fault-finder in medicines. Its action is that of an aperient and antacid; its composition of saline bases.

It effervesces briskly at first in water, but a number of the granules act more slowly, sinking to the bottom of the glass, and giving the solution an effervescent character for some considerable time. Even after the disengagement of most of the carbonic acid gas, the solution retains a mildly acid reaction, but is absolutely free from all mineral acids.

The agreeable saline and acid taste of Abbey's Effervescent Salt should make it popular as a mild but efficacious aperient, and as a safe antacid for use in all forms of auto-intoxication.

MEDICAL NEWS.

BRITISH CONGRESS ON TUBERCULOSIS.

THE Congress, which will be under the direct patronage of His Majesty the King, will be held in London, from Monday, July 22, until Friday, July 26, 1901. The following are the Sections of the Congress, with their Chairmen:—

SECTION I.—STATE AND MUNICIPAL.—*President*—Right Hon. Sir HERBERT MAXWELL, Bart., M.P., 49 Lennox Gardens, S.W.

SECTION II.—MEDICAL, INCLUDING CLIMATOLOGY AND SANATORIA.—*President*—Sir R. DOUGLAS POWELL, Bart., K.C.V.O., M.D., 62 Wimpole Street, W.

SECTION III.—PATHOLOGICAL, INCLUDING BACTERIOLOGY.—*President*—Professor SIMS WOODHEAD, M.D., 6 Scrope Terrace, Cambridge.

SECTION IV.—VETERINARY (TUBERCULOSIS IN ANIMALS).—*President*—Sir GEORGE BROWN, C.B., Bryn Hyfryd, Harrow.

EXHIBITION.—THE MUSEUM OF PATHOLOGY, BACTERIOLOGY, AND PUBLIC HEALTH.

Chairman of Museum Committee—Professor SIMS WOODHEAD, M.D., 6 Scrope Terrace, Cambridge.

All communications should be addressed to the *Honorary General Secretary*, Mr. MALCOLM MORRIS, 20 Hanover Square, London, W.

MONTHLY NOTES ON METEOROLOGY AND VITAL STATISTICS.

By A. LOCKHART GILLESPIE, M.D., F.R.S.E., F.R.C.P.Ed.,

MEMBER SCOTTISH METEOROLOGICAL SOCIETY.

METEOROLOGICAL MEANS FOR THE EAST OF SCOTLAND DISTRICT, FOR THE FIVE
WEEKS ENDING MARCH 30, 1901; AND FOR THE YEAR FROM JANUARY 1.

	TEMPERATURE.			RAINFALL IN INCHES.		SUNSHINE. HOURS.		Mean Daily Variability of Temperature.
	Mean.	Accumulated Day-Degrees.		Actual.	Accumulated from Jan. 1.	Actual.	Accumulated from Jan. 1.	
		Above 42°.	Below 42°.					
Mean .	39°·2	1* 78°	170°	2·6	7·4	118	215	3°·06
Observed	38°·0	2 143°	501°	3·1	6·5	91	175	2°·64
		1 45°	185°					
Difference	-1°·2	2 64°	535°	+0·5	-0·9	-27	-40	-0°·42
		1 - 33°	+15°					
		2 - 79°	+34°					

VITAL STATISTICS.

MORTALITY IN FOUR LARGE TOWNS IN THE EAST OF SCOTLAND (EDINBURGH, DUNDEE, ABERDEEN, AND LEITH), DURING MARCH, AND SINCE JANUARY 1, 1901. Actual Numbers and Rate per 10,000 per annum.

	TOTAL.		CONSTITUTIONAL DISEASES.		CIRCULATORY SYSTEM.		RESPIRATORY SYSTEM.		NERVOUS SYSTEM.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899	1 1320	224·5	252	42·9	124	21·2	292	49·6	147	25·1
	2 3808	215·8	694	39·3	350	19·8	865	49·0	416	23·5
Actual Deaths and Rate per 10,000	1 1201	204·2	239	40·6	126	21·5	224	38·1	149	25·4
	2 3620	205·2	731	41·4	363	20·5	683	38·7	402	22·8
Difference from Mean	1 - 119	-20·3	-13	-2·3	+ 2	+0·3	-68	-11·5	+ 2	+0·3
	2 - 188	-10·6	+37	+2·1	+13	+0·7	-182	-10·3	-14	-0·7

	DIGESTIVE SYSTEM.		URINARY SYSTEM.		PNEUMONIA.		PHTHISIS.		CANCER.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899	1 73	12·4	34	5·7	109	18·5	134	22·9	51	8·7
	2 219	12·4	90	5·1	312	17·7	359	20·3	153	8·7
Actual Deaths and Rate per 10,000	1 65	11·0	35	5·9	93	15·8	107	18·2	60	10·2
	2 228	12·9	106	6·0	275	15·6	329	18·6	181	10·2
Difference from Mean	1 - 8	-1·4	+ 1	+0·2	-16	-2·7	-27	-4·7	+ 9	+1·5
	2 + 9	+0·5	+16	+0·9	-37	-2·1	-30	-1·7	+28	+1·5

* NOTE.—The figures¹ denotes the data for March, ² for year to date.

The five weeks ending on March 30, 1901, were much colder than the average, the result more of deficient warmth than excess of absolute cold. In fact, only during the third week of the series was any excess of day-degrees of warmth over 42° F. noted, only on the fifth any increase over the average number of accumulated degrees below 42° F., although that week yielded a sufficient increase to more than equal the deficits of the first four by 15° . The rainfall was above the mean, the hours of sunshine and the mean variability of temperature below it. The sheltered thermometer fell as low as to 1° F. during the last week of March at Braemar, to 12° at Aberdeen.

The first three months of the year have experienced a great lack of warmth, and to a less degree an augmentation of cold, as compared with the normal. The rainfall has been almost 1 in. below the average, while bright sunshine also shows a great decrease.

During March, 119 fewer deaths occurred than expected, chiefly included under those from respiratory diseases and from phthisis; deaths from cancer alone showed any sensible increase. Influenza is debited with eighteen fatalities.

The values for the year to date yield a mortality decrease equal to 4 per cent. of the average total number of deaths; the deficit under respiratory causes practically equals that of the total as regards actual numbers, but amounts to 21 per cent. of the usual respiratory total. Deaths from nervous causes, from pneumonia and phthisis also, are below the mean. Cancer and urinary fatalities present increases of about 18 per cent. of their respective averages.

Although smallpox claimed no victims from among the inhabitants of the four towns discussed here, seventy-three deaths from it occurred in Glasgow, and one in Paisley, during March. Of these, fifty-five, or 75·3 per cent., had been vaccinated (including three in doubt as to the fact), nineteen unvaccinated, or 24·7 per cent. The difference in the incidence of cases as to age in the two classes is almost more marked than in January and February. Thus, of the fifty-two vaccinated and three unspecified but probably vaccinated persons dying from smallpox, none were under 20 years of age; of the nineteen unvaccinated, twelve, or 63·1 per cent., were of younger age, eleven indeed less than 5 years. If the figures for the last two months be added, the total works out as 167 deaths from smallpox, 120 vaccinated (doubtful in nine of these), forty-seven unvaccinated. The percentage of deaths which were recorded in persons below 20 years of age is 1·66 for the vaccinated, 61·7 for the unvaccinated; only two out of 120 among the former being under 20, but twenty-nine of the latter, and twenty-two of these under 5.

EDINBURGH MEDICAL JOURNAL.

ORIGINAL COMMUNICATIONS.

THE NATURAL AND ARTIFICIAL MINERAL WATERS OF NAUHEIM: THEIR PHYSIOLOGICAL AND THERAPEUTICAL EFFECTS, AND THEIR EMPLOY- MENT IN DISEASE BY THE SCHOTT METHODS.¹

By J. M'GREGOR ROBERTSON, M.A., M.B., F.F.P.S. (Glas.),
F.R.S.E., *Glasgow*.

I HAVE visited Nauheim for five consecutive summers. On four of these occasions I spent there from five to six weeks, undergoing the treatment myself. Between twenty and thirty of my own patients have had the treatment there, the majority under my own observation, and several on more than one occasion. I have also, through the kindness of Dr. Schott, had the opportunity of watching the effects of the baths on a large number of patients of various nationalities. For the past six winters I have employed the artificial baths at home, in a large number of cases, some of whom were unable to go to Nauheim, some of whom either before or subsequently had the treatment there. The number of artificial baths I have thus caused to be given amounts to over 4000.

Up to this time I have written nothing on the subject, though the experience I have briefly indicated might have justified me. So much, however, do I esteem the treatment, whether with the natural waters at Nauheim itself, or with the artificial waters in the patient's own house at home, that there are certain cases I should not consider to have justice done to them unless, if it were at all possible, they had had the benefit of this treatment in the one form or the other.

I propose, therefore, to endeavour to make my experience useful to those of my professional brethren who have no opportunity of visiting Nauheim themselves, and who find it difficult to lay hands on that kind of practical information which is so useful in advising one's patients.

¹ Read before the Medico-Chirurgical Society of Glasgow, December 1900.

I. ROUTINE AT NAUHEIM.—Nauheim is a little place of about 4000 inhabitants, swelled during the season by from 15,000 to 20,000 visitors. It nestles at the foot of the Johannesberg, the north-eastern spur of the Taunus Mountains, at an elevation of 452 feet above sea level. Its average temperature between May and October is $62^{\circ}4$ F. The warmest month is July, with an average temperature of $66^{\circ}3$ F. The pleasantest month is June, and those favoured by English visitors August and September. The modern portion of the town consists of hotels and villas for summer boarders, surrounding the baths Kurhaus and park. It wakes up from its winter's sleep about the middle of May, when the bath-houses open, and goes to sleep again about the end of September, when the season closes. The course of bath treatment lasts from five to six weeks. It has accommodation for every length of purse, the ordinary expense of board and lodging being £3 to £4 a week, though board and lodging in a German house may be had at 5 marks (5s.) per day. English is spoken at all the hotels; there is an English pension well conducted by two English ladies (Villa Fortuna), and a large number of the villa proprietors speak sufficient English to enable the non-German-speaking visitor to make arrangements. Most English and American visitors are found at the Hotels Kaiserhof, Sprengel Park, or Du Nord, the latter occupying the best position in the town, and in a short walk the stranger can find every variety of villa and boarding-house, where he may secure rooms with or without board. The Kurhaus is a splendid building, with recreation, news-room, etc., and a first-class restaurant; many people prefer to secure rooms in a quiet villa, and take their meals at the Kurhaus.

The visitor who goes for business, that is for treatment, does not usually wish to waste time. Having settled his rooms, therefore, he goes to Bath-house No. 2, and presents himself at the office in the waiting-room, where he pays his kurtax of 15s., for which he receives a yellow ticket, which entitles him to the free enjoyment of the Park and the Kurhaus, and (with certain exceptions) to attendance at the daily concerts on the terrace in front of the Kurhaus. Then he calls on one of the local physicians, who directs his treatment. The kind of bath being prescribed, he calls at the Bath Ticket Office, in the waiting-room of Bath-house No. 2, and buys a ticket for the prescribed baths.

The baths are usually taken between 6.30 A.M. and midday, or between 2 and 5 P.M. They cost much less at the afternoon hours, but very few English take them then. The most suitable time is between 9 and 11 A.M. An hour's rest in bed is prescribed after each bath, and it is best to have all this over by the midday lunch or dinner.

Further, one may arrange to have one's bath at a fixed hour.

Only a certain proportion of bath-rooms is reserved in each bath-house for fixed-hour bathers. The visitor must therefore apply to the Fräulein in charge at the waiting-room of the appropriate bath-house, to see if he can get a fixed hour. If one is not free, he may have his name put down, and perchance get one in a few days. But these baths at fixed hours are at a higher price. If he has not a fixed hour, then he takes his turn. The method is as follows: He presents his ticket to the presiding divinity in the waiting-room of the appropriate bath-house. She divides it in two, stamps one half, which she returns to him, marking a number upon it. This number indicates his place in the row of those waiting to bathe. On a board in the bath-house window is exhibited the number of those at the moment bathing, and, by comparing this with the number on his ticket, he will have a notion of how far off his turn is. A ticket thus stamped is available only for that forenoon. The number waiting for a bath, at each bath-house, is usually so great, that a bather who has presented his ticket at 9 is not likely to reach his turn till 11 or 12. It is usual, therefore, to take a walk to the bath-house between 7 and 8 A.M., or to get a friend to do so, or send a messenger, and get the ticket stamped, ascertaining how many are in front. In this way one can usually secure one's bath between 9 and 10 in the forenoon. If a bather, however, fails to turn up when his number is exhibited in the window, he loses his turn. One's calculations are thus often grievously upset. But in Nauheim the bath is the chief business of the day; the bath-houses are planted in the midst of a park, wonderful in its wealth of magnificent old trees, bright with every variety of flower-bed, and fragrant with roses; the weather is usually bright and warm; and I seldom found it a hardship to sit waiting my turn on a bench, in front of the bath-house window, reading my letters, or the newspapers, or the latest novel, or endeavouring to plumb the profundity of the German language, except when I was held an unwilling prisoner while a patient detailed all the vagaries of his stomach and liver.

II. THE NAUHEIM SPRINGS.—The springs of Nauheim are six in number, three used for bathing and three for drinking. The drinking waters are Kurbrunnen, Karlsbrunnen, and Ludwigsquelle. The chief ingredients of these three are chlorides, specially of sodium, present in the first to the extent of 1.54 per cent., in the second 0.98 per cent., and in the third 0.03 per cent. Small quantities of iron are also present—0.0026 in the first, 0.0015 in the second, and 0.0009 in the third. Lithia is also present in small quantities. The two former waters lie heavily on the stomach, and have no great place in the Nauheim treatment. The Ludwigsquelle water is rather like the Elizabethsbrunnen of Homburg. Its total solid constituents are 0.10478 per cent., and

it is used freely as a table water. Near Nauheim is a spring (Schwalheimer) which is bottled, and makes an excellent effervescing table water. The Kur and Karlsbrunnen are taken in the morning, the drinking place being in a detached, beautifully laid out portion of the Park. From 5 to 15 oz. are slowly sipped in the intervals of promenading up and down, while a band discourses, between 7 and 8 in the morning. Thereafter one returns to the frugal early breakfast of roll and coffee or tea. An hour and a half or two hours later, the bath is due. Then one slowly saunters back to one's hotel, drinks a cup of hot bouillon, and rests in bed, till the midday meal. The baths should never be taken sooner than one and a half to two and a half hours after a meal, according to its size.

The bathing waters are the chief elements in the treatment at Nauheim, and I must enter into particular detail regarding them. Up to the past year (1900) these springs were two in number, No. 12 or Friedreich Wilhelm's Quelle, and No. 7 or Der Grosse Sprudel. But boring operations were successful last year in the finding of a new spring, No. 14. All of these are rich in carbonic acid gas, so that the water rising to the surface in a vertical delivery pipe is, by the force of the gas, shot foaming into the air to a distance of 50 ft. In the case of Springs 7 and 12, the delivery pipe of each is carried vertically into the air to a considerable height; and, round the pipes, tanks, one for each spring, are built alongside of one another. Into these the water is received as it falls back.

The tanks are open to the air, much of the gas escapes, and in the tanks iron and lime, held in solution by the gas, are precipitated out.

The course of baths is begun with water drawn from one or other of these tanks, containing, therefore, an amount of gas less than that present in the water direct from the spring. From these tanks pipes are led to certain of the bath-houses, with a branch to each bath-tub. The arrangements permit the water to be heated, and permit the addition of any desired quantity of plain water. This is the *Thermal Sool-bad*.

Moreover, in the outskirts of the town, there are salt-works, to which, when the springs are not being used for bathing, the water is drawn and concentrated. It is then run into evaporating pans, and common salt crystallised out. The remaining dark brown, very pungent tasting liquor, called *Mutterlauge*, or mother-lye, is kept for adding to the bath to strengthen it. Some of it is evaporated to dryness, in which state it forms large, dirty brown masses with a crystalline fracture. This is Nauheim bath salt, eminently suitable for the artificial baths.

To certain of the bath-houses pipes are led from the springs before they reach the surface, and from them a branch to each bath-tub. Thus, into the bath-tub the water may be turned on,

foaming and bubbling directly from the spring in the earth. When the tub is full, this water is perfectly transparent, and of a light cerulean hue, and it sparkles like effervescing water in a tumbler. This is the effervescing, or *Sprudel-bad*. In one of the bath-houses, the tubs are so arranged that, by the removal of a plug, an overflow is provided at the top of the bath. When the bath is full the patient steps in and lies down, while the water foams in along the floor of the bath, and escapes at the top. This is the current, or *Strom-bad*, and is the most powerful therapeutically.

The Composition of Nauheim Bathing Springs.

CONSTITUENTS.	No. 7. Der Grosse Sprudel.	No. 12. Friedreich- Wilhelm Quelle.	No. 14. Der Neue Sprudel.	Mutter- lauge.	Nauheimer Badesalz.
Chloride of sodium . .	21·8245	29·2940	24·0692	1·62	33·259
„ lithium . .	0·0492	0·0536	...	15·70	3·645
„ calcium . .	1·7000	2·3249	1·6327	316·11	405·470
„ potassium . .	0·4974	1·1194	1·0825	24·84	68·259
„ ammonium . .	0·0550	0·0712	0·0660	...	0·154
„ magnesium . .	0·4402	0·5255	0·5634	41·23	83·899
Bromide of magnesium . .	0·0060	0·0083	...	2·23	0·593
Iodide „ . .	...	Traces	...	...	...
Sulphate of calcium . .	0·0347	0·0352	0·0602	16·67	{ 4·027 1·133
„ strontium . .	0·0390	0·0499	...		
Bicarbonate of calcium . .	2·3541	2·6012	1·8423		
„ iron . .	0·0383	0·0484	0·0303		
„ manganese . .	0·0065	0·0069	...	...	...
„ zinc . .	0·0104	0·0089	...	...	...
Silicic acid	0·0325	0·0213	0·0193	...	0·829
Arsenate of iron . . .	0·0003	0·0002	Alumina	...	...
Phosphate of iron . . .	0·0004	0·0007	0 0044	...	...
Organic substances . . .	Traces.	Traces.	...	...	...
Total solids in 1000 parts	27·0886	36·1696	29·3703	418·40	601·268

NATURAL TEMPERATURE—

		Centigrade.	Fahrenheit.
Spring No. 7		31°·6	88°·88
„ 12		35°·3	95°·54
„ 14		31°·2	88°·16

FREE CARBONIC ACID GAS—

		Parts per 1000 grms.	} at the temperature of the spring.
Spring No. 7		1·2634 = 738·4 c.c.	
„ 12		1·0074 = 574 „	
„ 14		1·1905 = 695·8 „	

The variety of baths is thus as follows:—

1. *Thermal Sool-bad* (the warm saline bath), of water drawn from the tank, and (a) warmed to the ordered temperature,

(b) weakened by the addition of sweet water, (c) or strengthened by the addition of 1, 2, 3, or more litres¹ of *Mutterlauge*.

2. *Sprudel-bad* (the effervescing bath)—(a) At its natural temperature, (b) cooled by the addition of ice, (c) strengthened by *Mutterlauge*.

3. *Strom-bad* (the current bath).

Each of these kinds may consist of water from Spring No. 7, 12, or 14, or a mixture of these. Thus a bath may be had of every variety of strength, temperature, and gaseous charge.

The foregoing table shows the composition of the three springs used for bathing, and of the mother-lye and bath salt obtained from them after concentration, removal of the common salt, and evaporation. The composition of the bath salt has not hitherto, I think, been published, and I am indebted for it to the courtesy of the Minister at Darmstadt, who kindly acceded to my request for it.

It will be noticed that the chief constituents of the waters are three—(1) common salt, (2) chloride of calcium, and (3) carbonic acid gas.

No. 12 Spring is richest in salts, containing nearly 3 per cent. common salt, and $\frac{1}{4}$ per cent. chloride of calcium, while *No. 7* contains $2\frac{1}{2}$ per cent. of the former, and $\frac{1}{8}$ per cent. of the latter; the new spring, *No. 14*, coming between the two, and very near to the latter, with its $2\frac{1}{2}$ per cent. common salt.

No. 7 Spring, on the other hand, is richest in gas, and is of lower temperature. One consequence of its lower temperature is that *No. 7*, when allowed to flow into the bath-tub, gives off its gas less rapidly than the warmer *No. 12* does. The ordinary observer therefore, seeing *No. 12* froth more vigorously in the bath-tub, imagines it to be richer in gas than *No. 7*. But just as a glass of iced champagne will maintain its sparkle longer than one un-iced, so the effect of the water of *No. 7* is more prolonged and more intense.

III. THE PHYSIOLOGICAL AND THERAPEUTICAL EFFECTS OF THE WATERS.—A consideration of the physiological and therapeutical actions of the Nauheim waters may be most practically introduced by briefly noting a typical case of a Nauheim patient, such as may be seen any morning in the season. He comes into the bathroom, walking slowly, breathing quickly and with some effort; his face is pale or grey, with a suspicion of lividity all over the face except the lips, where lividity is proclaimed. His pulse is quick, perhaps irregular in force and rhythm, soft, and compressible. His heart presents the evidences of dilatation with muscular failure; the heaving, tumultuous, or peristaltic beat; the extended area of dulness to the left, perhaps also to the right; the soft, ill-defined, and distant sounds, perhaps also an increased area of hepatic dulness.

¹ A litre, 1.75 imper. pints.

Let us suppose this patient steps into a No. 7 Sprudel bath, at a temperature of 89° F. At the end of a minute, if you ask him how he feels, in a quick, gasping way he will answer, "Very uncomfortable." And his countenance will confirm his answer. It is, if anything, greyer, and his lips darker, and there is something of anxiety depicted on it. The pulse has probably fallen very markedly in rate, and is harder and smaller. But in half a minute more, certainly within one minute more, the look of anxiety is gone, the colour is improving, the breathing is deeper and easier, the pulse is fuller and yet firmer, and, while much slower than when the patient stepped in, is not so slow as during the first minute. This improvement goes on till a healthy colour is in the patient's face, the lividity is gone from the lips, the breathing is quite easy, and the patient willing to speak. He will now tell you that he is very comfortable; that, when he stepped in, the bath felt cold, and his chest felt as if it were being sat upon, or as if his breast were gripped by something; that the sensation was very unpleasant, and made him indeed apprehensive, but that the feeling of coldness quickly left him; that he is now quite warm, and with the feeling of warmth a sense of comfort stole over him. You will find also that his pulse has risen in rate, as compared with the first minute, while it is much slower than before the bath, and that its quality is strikingly altered, being more regular, fuller, and less compressible. After ten, twelve, or fifteen minutes, when you ask your patient to step out, the chances are he will tell you that his feeling of ease is so marked he is quite willing to stay longer. As soon as the prescribed time is up, the patient steps out and is wrapped in a hot bath sheet; and at this point I ask you to make an observation of great importance, *his skin is uniformly pink, wherever it has been covered by the water. If part of an arm has been out of the water, or the water has barely covered the breast, the skin that has been in water is sharply marked off from the skin that has been in air by the bright pink of the one intensifying the whiteness of the other.* Dr. Saundby, when he visited Nauheim, failed to make this very elementary observation, and so vitiated a whole argument, as I shall point out. Now, when this patient I have been speaking of, after a moderately brisk rub with the warm bath sheet, given by the bath attendant, has dressed slowly, and proceeds quietly to walk home to sip his bouillon and take his midday rest, he is a very different man from the pallid, semi-livid, breathless man who entered half an hour before.

Now, there has been much discussion about the value of Nauheim, much assertion of equal results from rest and digitalis, much scoffing and cheap cynicism; but the contrast between the aspect of such a patient, as he enters and leaves the bath-house, is a matter of daily comment to the people sitting on the benches outside the bath-house. While learned members of medical

societies, who have never been at Nauheim, gravely discuss whether this thing is credible and the other thing possible, the man on the bench, who is twin-brother to the recently canonised "man in the street," tells what his eyes have seen, and marvels at the wisdom of the wise.

What explanation in physiological language can be offered of this contrast?

We assumed the bath to be at the temperature of 91° F. On stepping-into this bath, the patient, it is obvious, will feel the water to be cold, and the immersion into water so much below blood temperature will contract the arterioles of the skin, will thereby increase the peripheral resistance to the heart, and will slow the heart-beat. It is this increase of peripheral resistance that, in the case of the patient I have assumed, proves a strain to the already seriously burdened heart, and produces the temporary discomfort and even anxiety to which I have referred.¹ These effects are but momentary. Experience leads one to look with certainty for their disappearance in one to one and a half minutes. But, momentary though they be, it is not every patient one would subject to them without anxiety. It is during the rise of blood pressure in this period of vaso-constriction that there is risk of sclerosed vessels yielding, or even of cardiac shock.

As a matter of fact, however, no patient is ever thus plunged, right away, into a No. 7, or even the warmer No. 12, Sprudel bath. These effects can be almost entirely discounted by beginning the course with baths at a higher temperature—94°, 95°, or even 96°—and by dilution of the water.

The ordinary course is, indeed, to begin with a No. 7 or No. 12 thermal bath—that is, a bath made of water from the tank, with the addition of perhaps one-third sweet water, at a temperature of about 95°.

After a few baths, and after experience of the behaviour of the patient's heart and vessels, the strength of the bath is gradually increased, and the temperature gradually lowered, till the water from the tank is being used with the addition of 2 or 3 litres *mutterlauge*, and the temperature has, by successive falls, been brought to 91°, or thereby. Only after such a preparation, so to speak, on the part of the patient, and experience

¹ The water is so rich in gas and saline constituents, that I believe there is also a brief period of vaso-constriction, *due to chemical stimulation of the skin*. I do not think water alone, at a temperature of 91°, would produce vaso-constriction so great and rapid as to occasion the very marked oppression and præcordial anxiety which I have myself so often experienced.

Naumann ("Untersuch. ueber die physiologische Wirkung des Hautreizmittel, etc." *Arch. f. d. ges. Physiol.*, Bonn, Bd. v.); and

Röhrig ("Untersuch. ueber den Einfluss von Hautreizen auf Circulation," *Deutsche Klinik*, Berlin, 1873) showed that even slight stimulation of the skin caused contraction of cutaneous arterioles, increase of blood pressure, and an appreciable effect on the heart, exciting or retarding its pulsation according to other circumstances.

of the patient on the part of the physician—and such a preliminary course may extend to twelve or fifteen baths—only after this is the patient advanced to the Sprudel. Even then one has a choice of the Sprudel at $95\frac{1}{2}^{\circ}$ (No. 12) or at 89° (No. 7), and by a mixture of the two one may get all grades between.

But to return to physiology. By the action of the water, colder than the patient, and a brief vaso-constricting effect of the saline ingredients, there has been produced a rise of blood pressure, with its unpleasant effects on the patient's heart. This speedily yields, because, almost immediately on the patient's immersion, the specific constituents of the water begin to act upon the skin. The vaso-constriction yields rapidly, the surface arterioles widen, and the skin is everywhere flushed with a fresh tide of blood, and the patient is aware of it by the feeling of comfort and warmth that flows over him, sweeping away the chilliness of the first moment of immersion. This effect of the specific constituents of a bath has long ago been admitted. Leichtenstern¹ lays down the following propositions:—“The vessel-expanding after-operation of cold baths, and the vessel-expanding operation of warm baths, appear to be increased by the saline and gaseous contents of the baths. . . . Thermally indifferent baths, containing salts and gas, may, by their stimulations of the skin, act like mild epispastics, and occasion a slight expansion of the vessels of the periphery (hyperæmia of the skin).”

The vaso-dilatation is general and uniform. I believe it to be mainly due to a local chemical effect upon the immersed skin, because, as I have said, if one arm be kept partly out of the water, the part immersed is clearly marked off from the part in air, by the contrast in colour. This observation I have again and again deliberately made. But it is not exclusively so, for the patient's face gradually undergoes a flushing process also. This vaso-dilatory effect, overcoming the first brief vaso-constriction, is attended by a rise in the pulse rate above that of the first minute of immersion, and by a corresponding fall in the blood pressure.

Now, you cannot thus flush the whole surface of the body without producing profound effects on the circulation in every organ of the body. It would be difficult, I think, to over-estimate the effect on the deep organs and tissues by this widespread derivation of the blood. A general dilatation of the superficial arterioles must enormously increase the blood capacity of the skin, and, not to speak of the effect this must produce on the quality of the blood by its exposure to the activity of the skin, the effect on the deeper tissues, due to the withdrawal of blood from them, and the consequent quickening of the circulation through them, must be very great.

¹ von Ziemssen's "Handbook of General Therapeutics," vol. iv. "General Balneotherapeutics," 1885, pp. 285-287.

Leichtenstern, whom I have just quoted, is very loth to give his very physiological propositions their full therapeutical value. "We cannot declare *a priori*," he says,¹ "that the changes which take place in the distribution of the blood, in connection with cold and warm (local and general) baths, may not be of use therapeutically." Then he goes on: "It cannot be disputed that the increased or diminished supply of blood to the skin, which can be produced by baths, may be of use therapeutically in certain of its diseases, and as little that baths, which temporarily render the internal organs relatively anæmic, at the cost of the peripheral surface, may possibly operate favourably in conditions of disease which are accompanied with hyperæmia of the internal organs. The altered distribution of the blood may also sometimes influence favourably the movements of the lymph, the secretions, the finer processes of change of tissue, the absorption and the decomposition of pathological products. But there is no question that clinical observation must finally pronounce on those therapeutic conclusions which have been drawn from physiology." After many seasons spent at Nauheim, and after the experience of many patients treated there, it appears to me that it would be difficult to find anywhere so many opportunities of demonstrating the clinical proof of the physiological proposition.

This widespread derivation of blood, apart from any indirect effect through tissue change, must have a very direct effect upon the heart itself. Its burden must be greatly lessened both by the diminution in the peripheral resistance, and by the unloading of the internal organs. I do not see a flaw in the physiological reasoning which leads to the conclusion that the bath, apart from remote effects on lymph circulation, etc., immediately, and merely by the dilatation of peripheral vessels, lightens the strain on the heart, and thus, indirectly at least, makes it more fit for the work it has to do.

But it speedily becomes clear that this peripheral dilatation is not the only effect of the Nauheim bath. I have shown that such dilatation was a recognised physiological fact before its clinical significance was appreciated, and the failure to observe this phenomenon, as one of the most invariable effects of the Nauheim waters, has, I believe, been one of the chief reasons why some of our foremost physicians have unfortunately failed to recognise adequately the value of this treatment. Dr. Saundby failed to observe the reddening of the skin by the action of the water, due to the fact that in Nauheim "he² did not have an opportunity of seeing a patient in the bath"; and I may remark that in several places his paper bears the evidences, in inaccuracies of considerable importance, of his very limited experience of the bath as

¹ *Op. cit.*, pp. 292, 293.

² "Remarks on the Nauheim (Schott) Treatment of Heart Disease," *Brit. Med. Journ.*, London, 1895, vol. ii. p. 1081.

given in Nauheim. He says: "It is well known that a bath of lower temperature than the body causes more or less contraction of the vessels of the skin, while a bath which is hotter dilates them; moreover, the gaseous or saline constituents do not stimulate to greater vascular contraction; on the contrary, they favour dilatation. All authorities are agreed that a cool bath eventually lowers the number of heart-beats. . . . The question is, whether this reduction of the number of the heart-beats is merely the result of the operation of Marey's law—contraction of the vessels of the skin increasing the blood pressure, and thereby slowing the heart—or whether it is the result of a reflex inhibitory influence."¹ . . . "If the effect of the baths and exercise be to diminish the blood pressure, the heart's action—following Marey's law—should be quickened; but all are agreed that the pulse is slowed."²

"I agree with Sir William Broadbent that the principal and primary effect of the baths and exercises is on the peripheral circulation, but that effect is to raise the blood pressure, and the heart becomes slower, in accordance with Marey's law."³ If it only regulates the heart's action, it can do no harm; but it does more than that: it raises the blood pressure, increases the tension of the walls of the heart and arteries, and where myocarditis is very advanced, or the vessels are ready to give way from disease of their walls, it may produce disaster."

I quote so extensively, because these sentences emphasise incidentally the great significance of the phenomenon which they overlook by the ridiculous argument to which the oversight leads, and because they bring into contrast the peripheral dilatation and the other phenomena of the Nauheim bath. These other phenomena are—(1) slowing of the heart-beat; (2) strengthening of the heart-beat; (3) diminution in the area of cardiac dulness; and (4) changes in the blood pressure, in the direction of heightening or lowering, according to other concomitant circumstances. I propose to examine Dr. Saundby's argument, because I find it is a staple weapon to those who see little good in the Nauheim treatment, who use it under the delusion that it is physiologically sound, and because an examination of it will dispose of some of the most specious reasons given for a refusal to recognise the value of the treatment in heart failure.⁴

¹ *Ibid.*, p. 1082.

² *Ibid.*, p. 1083.

³ *Ibid.*, p. 1085.

⁴ Thus R. F. C. Leith, in "An Inquiry into the Physiology of the Action of Thermal Saline Baths and Resistance Exercises in the Treatment of Chronic Heart Disease" (*Lancet*, London, 1896, vol. i. pp. 761 and 841), attaches little importance, if any, to the local effect upon the skin of the specific ingredients of the bath. "There is no evidence whatever to support claims which maintain a great and direct influence upon the heart, whether by nervous channels or by greatly lessening the peripheral resistance" (p. 843). He actually attributes undeniable improvement, observed in the cardiac conditions, to the stimulus due to a fuller ventricle, caused by increased peripheral resistance. To restore the tone of a failing heart muscle by throwing more work upon it, is aptly described by Dr. Woods Hutchinson as akin to the "boyish attempts to lift one's self by one's bootstraps."

The argument briefly put is: The Nauheim bath, because it is of a lower temperature than the body, produces vaso-constriction. It therefore raises the blood pressure; it is this raised blood pressure which slows the heart's action, "in accordance with Marey's law." This, in a person with a weak-walled heart, or with sclerosed vessels, may easily be disastrous.

I have already shown that this argument is, at the outset, destroyed by the fact that the real effect of the bath is vasodilatation, and not vaso-constriction. But what is Marey's law, which is thus appealed to as a physiological canon. I give the law below¹ in the original. "The frequency of the pulse is in inverse ratio to the arterial tension." It is the generalisation of a relationship between blood pressure and rate of heart-beat. But the law has been used as if it were a foot-rule or a mathematical axiom, or as if blood pressure and cardiac rate were the opposite ends of a rigid bar poised in the middle like a child's seesaw—when the one is up the other is down, and *vice versa*. Thus the argument is: "The heart pace is lessened all authorities are agreed, therefore the peripheral arterioles must be contracted, otherwise there could not be the necessary rise of blood pressure; or, conversely, the blood pressure is not lowered, else the heart's action should be quickened." This, I submit, is a most improper way of bringing in physiological facts to the settlement of clinical problems. But the relationship between blood pressure and rate of heart-beat is not a mechanical one.²

A typical mechanical relationship is seen in the speed of a steam-engine and the resistance to its work. Thus, let the resistance be suddenly diminished, the machinery begins to race as in a steam vessel when, in a heavy sea-way, the propeller is lifted out of the water; let the resistance be increased, as when the vessel plunges down into the water, the engine goes very slowly. In the case of the heart the relationship is a vital one. It "only holds good if the vagi be intact. If these be previously divided, then in whatever way the blood pressure be raised . . .

¹ Marey, "Physiol. méd. de la circulation du sang," Paris, 1863, p. 209: "Ce sera donc la tension artérielle qui, *dans la plupart des cas*, nous indiquera la résistance que le cœur doit éprouver, de sorte qu'on peut formuler ainsi, *d'une manière presque absolue*, la loi qui préside à la fréquence du pouls—

"La fréquence du pouls est en raison inverse de la tension artérielle."

I have printed the qualifying phrases in italics, showing as they do the fact that the rule, though general, is not necessary and invariable.

² That Marey viewed it, however, as a mechanical one is clear from the illustrations he uses. "Ne voit on pas que tout muscle qui doit fournir un certain nombre de contractions, exécute celles-ci d'autant plus rapidement qu'il a moins de résistance à vaincre.—Ainsi, qu'un homme ait à franchir une certaine distance, ne le fera-t-il pas d'autant plus vite qu'il sera moins chargé, autrement dit, que ses muscles auront moins de résistance à vaincre.—Cherchons à exécuter des mouvements alternatifs avec la main plongée dans l'eau, nous n'y arriverons que péniblement et lentement; exécutons les mêmes mouvements dans l'air, nous pourrions les produire avec une rapidité extrême."—*Op. cit.*, p. 206.

or in whatever way it be lowered, no such clear and decided inverse relationship between blood pressure and pulse rate is observed. It is inferred, therefore, that increased blood pressure causes a slowing of the pulse when the vagi are intact, because the cardio-inhibitory centre in the medulla is stimulated by the high pressure, either directly by the pressure obtaining in the vessels of the medulla or in some indirect manner, and the heart in consequence to a certain extent inhibited."¹

When, therefore, Saundby says:² "The question is, whether this reduction of the number of the heart-beats is merely the result of the operation of Marey's law—contraction of the vessels of the skin increasing the blood pressure, and thereby slowing the heart—or whether it is the consequence of a reflex inhibitory influence, as Dr. Schott believes," he is evidently unaware that though the reduction in the number is merely an illustration of Marey's law, it is still a reflex inhibitory influence, and he is opposing things, in different words, which are really the same. When, also, he submits³ "diagrams and pulse tracings, taken from cases treated during the last few weeks in the wards of the General Hospital," which "support the general proposition, namely, that the baths diminish the area of dulness, while increasing the force and tension, and diminishing the frequency of the pulse," he is himself offering proof of Dr. Schott's view of the *modus operandi* of the baths, which, he says, has not been demonstrated.

It may also be added, that experimental physiology can adduce many instances of marked fall of blood pressure without any corresponding increase of heart-beat, and of steady rise of blood pressure without any slowing of heart-beat. Indeed, the type, the model, the standard illustration of the relationship between peripheral resistance and heart is an instance of this—that of the depressor nerve of Ludwig and Cyon. Stimulation of its brain end causes a marked but gradual fall of blood pressure in the carotid, *unattended by marked change in the heart-beat*, a fall which "must be due to the diminution of peripheral resistance, occasioned by the dilatation of some arteries."⁴

And the appositeness of this illustration to the subject in hand is obvious when one remembers that "by means of this afferent nerve from the heart the peripheral resistance is, in the living body, lowered to suit the weakened powers of a labouring heart" (Foster).

I have shown, then, that the criticism of the Nauheim treatment is founded upon a misapprehension of the meaning of Marey's law, and upon a mistaken idea of its necessity and invariability. But these are not the only fallacies in the argu-

¹ Foster, "Text-Book of Physiology," 1888, vol. i. p. 305.

² *Op. cit.*

³ *Ibid.*, p. 1082.

⁴ Foster, *op. cit.*, p. 324. See also p. 325 for an illustration of rise of pressure unattended by slowing of the beat.

ment. For the argument assumes that a rise or fall of blood pressure necessarily follows a rise or fall of peripheral resistance. This is not so. The blood pressure is not hopelessly at the mercy of the peripheral resistance.

Blood pressure is not the product of peripheral resistance; you might sweep away the whole arterial system and yet have blood pressure so long as you had a contracting heart with full chambers. Blood pressure is rather the product of a contracting heart. But in the circulatory system, as we have it, it is dependent on two factors, not on one only, namely, on the energy of the cardiac contraction, and, secondly, on the diameter of the smaller arteries. Given that the energy of the heart's contractions remains constant, then you would expect the blood pressure to rise and fall proportionately to contraction or dilatation of arterioles, at least if a considerable vascular area be involved; and, on the other hand, given that the degree of arterial constriction remains constant, then you would expect the blood pressure to rise and fall with increase or diminution in the strength of the heart's beat.

"It is entirely erroneous," says Leichtenstern, "to assume, as is so often done, that the blood pressure is also increased whenever contractions occur in an extended circle of vessels from the stimulation of sensory nerves. Influences of this kind, which increase the blood pressure, may be entirely compensated by a tone of vessels that diminishes the pressure, and also [the italics are mine] *by simultaneous alterations in the energy of the heart contractions.*"¹

"When warmth dilates the cutaneous vessels, it at the same time constricts the abdominal splanchnic area, and prevents an undesirable fall of pressure."²

"Though the arterioles exert a leading influence in lowering or in raising the mean arterial pressure, there is another variable factor which contributes its share in the result, namely, the behaviour of the heart muscle."³

It is merely putting the same thing in another way if we say that a fall of blood pressure, which would attend vaso-dilatation, if other things remained constant, may be compensated for by increased energy of cardiac contractions. But the critics we are examining ignore the rôle of the heart, the main factor in the production of blood pressure, and argue as if peripheral resistance were the sole cause of its rise and fall.

The point we have reached then is this, that while the critics of the Nauheim method assume vaso-constriction to be the main result of the bath, and so reduce the problem to the simple one of an increased peripheral resistance raising the blood pressure, and so slowing the heart, it is in reality a much more complicated

¹ von Ziemssen's "Handbook of General Therapeutics," London, 1885, vol. iv. p. 289.

² Foster, vol. i. p. 348.

³ G. Oliver, "Blood and Blood Pressure," London, 1891, p. 141.

question. For the real effect is much more singular and even—if one chooses to call it so—paradoxical, namely, a wide-spread vaso-dilatation, attended by a slow heart-beat, whether the blood pressure rises, as it often does, or falls, as it sometimes notably does, or remains comparatively little changed. I say, this is the phenomenon that requires explanation. Why is it that, with general dilatation of the superficial arterioles, flushing of the skin with blood, and the necessary accompaniment of lessened peripheral resistance, why is it that with these things you have a slower heart-beat? The slower heart-beat, that is to say, is not due to *contracted cutaneous* arterioles, but exists in spite of *dilated* arterioles. I have shown that there is no physiological contradiction in these things, but the question remains, how do you explain their coincidence? There is obviously only one explanation, and it is this, that apart altogether from, and independent of, the vaso-dilatation, other effects are produced upon the heart itself, owing to which its beats are slowed and strengthened. These, therefore, must be due to reflex stimulation of the cardiac regulator nerves. Is there anything marvellous in this? Is a reflex effect upon the heart and respiration, and deglutition also for that matter, by stimulation of the skin, not a physiological truism?

There are two effects, then, of Nauheim waters quite different in kind—(1) The chemical action on the skin, producing vaso-dilatation; and (2) the reflex nervous action on the heart. By the first the work of the heart is lightened, by the other its ability to do its work is increased. There still remains the question, What happens to the blood pressure? I have already pointed out the utterly fallacious manner of speaking of blood pressure, as if it were merely a function of the peripheral resistance, bound to share its fortunes. Theoretically, it is clear that the vaso-dilatation would tend to lower the blood pressure, and the increased cardiac energy to raise it. But the vaso-dilatation sets in first, and is more pronounced in one patient than in another. The full tale of the effects of the Nauheim waters on blood pressure could therefore only be unfolded by a continuous graphic record, for which there is no apparatus yet available. But my observation leads me to the belief that the effect, in brief, is as follows:—

The moment the patient steps into the bath he is affected by the temperature of the water, perhaps slightly reinforced by a constricting effect of the saline ingredients, the blood vessels are contracted, the blood pressure is raised, the pulse is very markedly slowed, and a strain is thereby thrown on the heart. But these effects are only momentary, and quickly yield to the real effects of the specific ingredients of the waters. The capillaries dilate, the increase in the blood pressure is lost, and a fall sets in, and the pulse rate rises slightly. But though the peripheral resistance

goes on diminishing by increasing vascular dilatation, the fall in blood pressure ceases to keep pace with it, and so also does the rise in pulse rate, because the later effects of cardiac stimulation begin to operate. After some time, therefore, a condition of vascular equilibrium is established, the tendency to a marked fall of blood pressure being counterbalanced by a greater energy of ventricular contraction. The point to observe is, that here the blood pressure is not dominating but dominated. Whether it be higher than when the patient entered the bath, or lower, will depend on other circumstances. For it must be remembered that the pathological condition of the patient is an important factor in the ultimate result. If he be an illustration of a disordered vascular system, due to a weak, dilated, inefficient heart, the possibilities are that with a quick pulse he has a low blood pressure. This is a type of case in which Nauheim abounds. In such a case the effect of the bath will be to slow the pulse, and raise the blood pressure to something more near the normal. But the rise is nevertheless attended by lessened peripheral resistance, and is due to increased energy of the heart. On the other hand, the patient may be a gouty subject, who, along with cardiac insufficiency, has a high blood pressure, due to spasm of the arterioles, or engorgement on the side of the veins, and with a pulse weak, and, in spite of the high blood pressure, fast. In such a case, the result of the removal of the vaso-constriction and the strengthening of the heart-beat will be a fall in blood pressure towards the normal, and a fall also in pulse rate.

But the mere figure which states the height of a blood pressure is nothing, unless there is some understanding of the nature and relation of the forces which produce it. Thus a patient may have a normal blood pressure in spite of a failing heart, because of vasomotor spasm, and he may step into a bath and twenty minutes later step out, and the blood pressure before and after the bath may show scarcely a millimetre of difference, while in the interval the whole mechanism of its production may have been altered.

Happily these are not mere opinions. Within the last few years, clinical methods of determining blood pressure have been made more simple and reliable. No one has done more in this direction than Dr. George Oliver, and illustrations can be found of all these statements I have made in his work on blood pressure, already referred to. There, proof will be found of the statement that a bath may increase the blood pressure without altering the pulse rate,¹ and may lower the blood pressure without altering the pulse rate, or may simultaneously lower the pressure and pulse rate. As regards the Nauheim baths, other observers have published concordant results. Thus Edgecombe and Bain² show,

¹ *Op. cit.*, p. 236.

² "The Effects of Baths, Massage, and Exercise on the Blood Pressure," *Lancet*, London, 1899, vol. i.

as the effect of a thermal bath, a pulse of 54, with a mean arterial pressure of 115, raised to 60, with a blood pressure of 110; a fall of pressure in a bath of a temperature of 93° F. Another case shows a pulse rate of 88, and a mean pressure of 125, reduced to 84 and 105 respectively. The temperature of this bath was also 93° F. But, according to the critics, vaso-constriction ought to have been produced, causing a rise of blood pressure to account for the slowing of the pulse.

I may quote from another source¹ the results in a case of angina, where, with a pulse frequency of 66, a pressure of 200 was, by a No. 12 Sprudel, reduced to 188 in three minutes, 170 in five minutes, 150 in ten minutes, and after fifteen minutes immersion to 140, yet the pulse frequency was also lowered to 60. In the same case, another bath, after eight minutes immersion, lowered the pressure from 140 to 120, the pulse remaining unaffected.

I think that I have shown, then, that the first effect of the Nauheim bath is to produce general cutaneous dilatation, that its next effect is to act upon the nerve regulator mechanism of the heart, that its admittedly slowing effect upon the heart-beat is through this mechanism, that this effect is a thing apart from rise or fall of blood pressure, and that the blood pressure may be raised, or may be lowered, or may seem to be unaffected, depending upon the nature of the pathological conditions for which the bath is employed.

The bath thus does two things—

(1) It effects a complete change in the distribution of the blood, and thus diminishes the resistance the heart has to overcome; and (2) it stimulates the heart to more energetic contraction, while diminishing its pace. It thus lightens the heart's burden, while making it more fit to undertake it. In a word, the bath tends to restore the balance of the vascular mechanism, and if it happen, as in one type of case it always does, that the blood pressure is raised, this is the evidence of approximation to the normal, and not the menace of disaster.

I do not think it necessary to discuss the diminution of the area of cardiac dulness. I can hardly imagine any one spending, not an hour or two, but a few weeks, at Nauheim, and taking advantage of opportunities that he will find cordially afforded him, coming away unconvinced. There will always be sceptics, and they mostly remain at home. I know of no way by which they may be convinced, unless it be by the Röntgen rays.² It seems to me, also, that those who admit the diminution, but explain it by alterations in every other organ but the heart, try to get rid of

¹ Gräupner, "Nauheimer Mineralbäder und einfache Wasserbäder—ihr Einfluss auf Blutdruck und Herzthätigkeit," *Allg. med. Centr.-Ztg.*, Berlin, 1896, Nos. 61 and 62.

² Theodor Schott, "Cardiac Shrinkage due to Baths and Exercises, shown by Röntgen Rays," *Deutsche med. Wchnschr.*, Leipzig, No. 14, p. 220.

one difficulty by creating a greater. I think the controversy which has been raised, and the investigation to which it has led, have opened the eyes of many to the possibility that the normal heart even may undergo changes formerly unthought of. It is surely not unreasonable to suppose that a widely dilated heart, whose wall has become thinned out, and whose muscular fibre has lost elasticity and tone, may vary in size according to the pressure acting on it from within, may yield when that pressure becomes greater, and may retract if that pressure becomes by any means greatly lessened.¹ In one case, I am satisfied I saw the evidences of such changes, indicated both by alteration in the marked-out boundaries and in the position of the apex-beat as well, the two observations having been made within an hour of one another, the first before the patient had risen, and the second after he had dressed and walked down to the bath-house, the strain of walking bulging out the heart and displacing the apex-beat.

(*To be continued.*)

THE RATIONAL AND COMPREHENSIVE STUDY OF THE HEPATIC SYSTEM.

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(*Concluded from page 422.*)

IV. CLINICAL INVESTIGATION AND PHENOMENA.—The methodical study of the hepatic system from a clinical point of view, on comprehensive lines, demands careful and intelligent attention, not only in the abstract, and in relation to its several diseases, but also in every individual case with which the practitioner has to deal. The casual and unsatisfactory manner in which this system is, I might almost say, habitually regarded in ordinary practice, and the want of definite knowledge with respect to important clinical facts, lead to grave errors in diagnosis, negative and positive; while treatment is often founded upon mere “jumping at conclusions,” on altogether inadequate data, or, indeed, upon little more than guess-work. And before proceeding further, I must emphatically protest against making the “liver” a “specialty,” for which in the large majority of cases there is not the slightest foundation or excuse. The investigation of this organ, and indeed of the entire hepatic apparatus, is as a rule well within the scope of every properly trained practitioner, if he will only take the

¹ Refer to Leith's paper, *loc. cit.*, p. 760.

trouble to carry it out in an intelligent and rational manner. Of course, difficult cases do occur now and then, in which the opinion of some one who has had opportunities of studying hepatic affections under special circumstances, for example, in tropical climates, may be of considerable weight; or where the help of a surgeon of experience, or possibly even of the "pathological chemist," may be necessary to clear up the diagnosis; but such cases are quite exceptional, and can be dealt with on their own merits.

A. Symptomatology.—At the outset it is most desirable to have a clear and definite knowledge of the symptoms which may be associated with the hepatic system, and which are presented, either singly or in various combinations, in particular cases. Further, it is important to learn and to endeavour to understand the symptomatology, positive and negative, of the several diseases affecting this system, as described in text-books or special treatises. The fact cannot be too strongly insisted upon that in some affections of the liver, even of a pronounced character, anything like definite symptoms are, as a rule, entirely absent, their absence being easily explained. The same statement applies to the gall bladder and cystic duct not uncommonly; but any interference with the hepatic or common duct, or with the portal vein, is most likely to attract attention at once. Certain liver diseases are usually attended with prominent local symptoms, and we expect to meet with them, but it is again a remarkable fact that even in these diseases such symptoms may be entirely absent or in no way significant, at any rate for a time, and until the morbid changes have made considerable progress. Hence the importance of personal physical examination of the hepatic structures, should there be any reason to suspect that they are the seat of organic mischief; while they certainly should not be ignored when passing lives for insurance or other allied purposes, especially as age advances, and when "habits" are doubtful.

It is not my intention to deal with hepatic symptoms at any length, or to discuss the symptomatology of individual diseases. I desire, however, to offer a few remarks about certain of the more prominent phenomena, more especially to illustrate and emphasise the necessity of always regarding the hepatic system from a comprehensive standpoint. Before doing so, it may be convenient to present the following summary of possible symptoms, as a basis of discussion:—

1. Painful or other sensations in the hepatic region, or "referred" to some other locality.

2. Definite "biliary" symptoms, due to some disorder affecting the secretion or discharge of bile, especially jaundice and its accompaniments in various degrees.

3. Phenomena indicating more or less difficulty involving the portal circulation, especially actual obstruction. Apart from indefinite digestive disorders and bowel disturbances, which no

doubt are frequently due to this cause, those more positively referable to portal obstruction include—

(a) Ascites, with chronic peritoneal inflammatory changes in course of time. (It may be noted that the peritoneal veins become dilated, and internal hæmorrhage has occurred from their rupture in exceptional instances, but such an event would probably only be discovered post-mortem.)

(b) Dilated superficial abdominal veins after a while, especially when there is abundant ascites, which may extend to the lower part of the thorax.

(c) Hæmatemesis, melæna, or both, sometimes very grave.

(d) Hæmorrhoids, according to generally accepted ideas, liable to bleed.

(e) Enlargement of the spleen, often well marked and permanent, with increased firmness.

(f) Menorrhagia, in some instances probably owing to the anatomical venous communications.

4. Symptoms connected with the alimentary tract—mouth and tongue; odour of breath; and gastro-enteric disorders, indicating more or less definite morbid changes, resulting from different causes originating in the hepatic system.

5. General symptoms, subjective and objective; as well as remote phenomena associated with independent organs or systems.

6. Changes in the urine.

7. Symptoms due to physical interference with neighbouring structures, or to special lesions.

I propose now to offer a few observations on each of these groups of symptoms.

1. Any *subjective sensations* referred to the hepatic region should always be regarded with rational caution, and studied on intelligent lines. Pain and tenderness, especially the latter, are, as is well known, likely to be associated with certain diseases of the liver, whatever the actual cause of the sensations may be; or there is merely a feeling described as fulness, heaviness, weight, tension, and the like, generally associated with enlargement or certain displacements of the organ. To jump to the conclusion, without due investigation, that such sensations referred to the right hypochondrium or its vicinity, especially pain, are necessarily associated with the hepatic system at all, and still more with the liver itself, is a dangerous but very common error, and I have known not a few grave mistakes in diagnosis result from this tendency. Thus they have turned out to be connected with affections of the stomach, intestines, pancreas, kidney, or peritoneum; or severe pain, supposed to be of hepatic origin, has merely been one of the initial symptoms of pleurisy with effusion, or lobar pneumonia.

Assuming that subjective sensations have been definitely located in the hepatic structures, it then becomes necessary to try to understand their significance and actual cause, and this particularly

applies to pain and tenderness. The term "hepatalgia" has been used very vaguely, but more especially to indicate a supposed neuralgia. It may be confidently asserted, however, that there is no such pain associated with any part of the hepatic system, apart from some physical or pathological change to account for it. With regard to the liver itself, when it is painful or tender, the sensation is, as a rule, really perihepatic or peritoneal, rather than in the substance of the organ. This superficial pain is more particularly due to tension or stretching of tissues, or to inflammatory changes.

The severe painful attacks associated with the passage of gall stones, known as *hepatic colic*, are as a rule highly characteristic, and the practitioner must always be prepared to meet with them. Apart from such attacks, however, the presence of a more or less constant or frequent pain in the right hypochondrium, with or without tenderness, if it can be definitely referred to the hepatic system, points much more commonly to the gall bladder than to the liver, and is always suspicious of gall stones. But, as illustrating a further difficulty, I may mention a case which I saw in consultation, and which was subsequently operated upon by my friend and colleague, Mr. A. E. Barker. The patient, a female beyond middle age, had suffered for a long period from pain in this locality, subject to marked exacerbations, but without any other evident symptoms, or any signs to be detected on physical examination. The diagnosis seemed to point pretty clearly to gall stones, to which I personally inclined, though feeling by no means certain. An eminent physician, however, gave a most positive and absolute opinion in favour of such a diagnosis. Nevertheless the operation proved that he was wrong, for there was no trace of a biliary calculus anywhere, and the pain was found to be due to a definite fibrous thickening and adhesion in the vicinity. This was loosened and manipulated; the patient made an excellent recovery, and was entirely cured of her pain.

It may be regarded as the height of incredulity and heterodoxy to cast any doubt on the connection between "shoulder-pain" and liver affections, which has been such a favourite notion with the profession and the laity from time immemorial. I have no hesitation in affirming, however, that its frequency is greatly exaggerated; and to place reliance, in a routine fashion, upon pain in the right shoulder as a factor in the diagnosis of hepatic disorder or disease is likely to prove extremely misleading, from several points of view. That it may be associated with actual organic disease of the liver is highly probable, and the connection can be readily explained. But it really is quite amusing to note how the laity, and indeed, not uncommonly, members of the medical profession, are disposed to attribute every painful or other sensation, not only in the right shoulder but in the left, between the scapulæ, or indeed over any part of the chest,

especially its posterior aspect, or even the lumbar region, to "disordered liver," when it is obviously of an entirely different nature, and often definitely associated with the superficial structures. I have several times known grave anginal attacks attributed to this organ, to the decided disadvantage of the patient.

2. *Biliary symptoms.*—Jaundice is obviously one of the most prominent and important symptoms to be studied in relation to the hepatic system, and modern investigations seem to prove conclusively that there is no such variety as "hæmatogenous jaundice," but that this condition, where at all pronounced, is invariably associated with some actual morbid state affecting different parts of the biliary apparatus. I have no intention of discussing jaundice in its several aspects, but only desire to draw attention to certain practical points relating to it as a symptom. When present, it should of course always be duly investigated on definite and systematic lines, as regards its mode of onset, tendency to recurrent attacks, degree of intensity, course and duration, whether temporary or permanent and progressive; also taking into consideration the accompanying phenomena, both subjective and objective. There is one part of the investigation which is often carried out in a very casual manner, if at all, and that is, examination of the stools. It cannot be too strongly insisted upon that the alvine evacuations demand careful observation in cases of jaundice, not merely once in a way, but during their entire course. The slighter degrees of icterus, giving rise to the appearance commonly described as "bilious," are chiefly evidenced by the colour of the eyes, and by indications of the presence of bile in the urine, and it is in these directions that clinical inquiry must then be conducted. When jaundice is pronounced, the general discoloration is, as a rule, quite characteristic, but it must be borne in mind that it may be modified by its association with cyanosis, anæmia, cutaneous hæmorrhages, peculiar pigmentations, malarial cachexia, the effects of a tropical sun, or other abnormal colorations.

Jaundice being present, no matter in what degree, the laity almost invariably assume that it is directly due to some morbid state of the "liver," and a similar tendency is by no means uncommon amongst medical practitioners. Therefore, as a striking illustration of the essential importance of taking a comprehensive view of the hepatic system, it will be well to emphasise the fact, that in the large majority of cases jaundice and its accompaniments are not the result of liver disease at all, but of some physical interference with the escape of bile after its formation—as a rule, of course, the result of various obstructive conditions involving the hepatic or common bile duct, with subsequent excessive absorption. Indeed, the more healthy the liver is, and the more vigorously it acts as a secreting organ, the more pronounced are the phenomena of jaundice likely to be under the circumstances.

It is a remarkable fact that the hepatic secreting structures may be practically destroyed extensively or throughout, as in advanced cirrhosis, yet with scarcely even an icteric tint. There are certain diseases of the liver with which jaundice may be directly associated, but then bile is usually either pent up within its own ducts and tissues, as in some forms of hypertrophic cirrhosis, or one of the larger ducts is directly obstructed, as by a growth or fibrous thickening from chronic perihepatitis. In acute yellow atrophy the rapid breaking down of the bile-containing hepatic tissues accounts for the accompanying jaundice.

The fact is quite familiar that bile is secreted under exceedingly low pressure, and a very slight difficulty, whether in the course of its passage towards the intestine, or at the orifice of the common duct, will prevent its proper discharge. This is well exemplified by cases of so-called "catarrhal jaundice," which, in my opinion, constitute a real and definite group, though attempts have been made to cast a doubt upon them; and temporary jaundice may probably arise from kinking of the duct. In a large proportion of instances, however, the obstruction is much more pronounced, and its cause is often obvious enough, gall stones having again to be particularly borne in mind in this connection, though other possible causes, especially those due to morbid conditions in the vicinity, must not be forgotten in doubtful cases.

It seems highly probable that a certain degree of icteric tint may be due to excessive absorption of bile from the intestinal canal, following undue retention as a consequence of accumulation of feces, but such a condition cannot give rise to anything like pronounced jaundice. It must be remembered that even in cases of marked jaundice the stools may be quite normal in colour, showing the presence of bile in quantity; and this fact may be of importance in arriving at a correct diagnosis, as in the following interesting case which came under my care at University College Hospital. The patient exhibited the external manifestations of this symptom in considerable intensity, but the stools were quite satisfactory in colour and other characters, and there was evidently no interference with the escape of bile by the ducts. The symptoms and physical signs pointed clearly to gastric cancer; and further examination showed that the left lobe of the liver was implicated throughout, while the right lobe seemed altogether free. This was the diagnosis I arrived at; and I pointed out to my clinical class that the icterus was directly due to the disease of the left lobe, while the right lobe secreted bile in good quantity, which was discharged without difficulty into the intestinal canal. The post-mortem examination entirely confirmed this view of the morbid conditions present.

When what appears to be originally a simple catarrhal jaundice becomes prolonged and practically chronic, as well as very pronounced, there must always be the fear that the cause of

the obstruction has been from the first of a more serious nature, or that subsequent morbid changes have taken place rendering it permanent and irremediable. Cases, however, do occasionally occur, of which I have met with some striking examples, showing that even after a long period, it may be many months, jaundice supposed to be of catarrhal origin, but which had given no indication of being influenced by any kind of treatment, may ultimately disappear of its own accord, and for no apparent reason, confirming therefore the original diagnosis.

The well-known general subjective sensations associated with jaundice are of much interest, but I must refrain from discussing their significance on the present occasion. Amongst them the bitter taste, which is complained of often in connection with so-called "biliousness," as well as in cases of definite icterus, deserves particular attention, but it will be more convenient to refer to this sensation in relation to the alimentary canal.

In contrast to jaundice and its accompaniments, we sometimes meet with cases in which there is an excessive flow of bile, giving rise to bilious diarrhoea or vomiting, or both. It is customary to attribute these phenomena also to a "bilious attack," or to some liver disorder or disease, which is obviously absurd, for they clearly indicate that the organ must be in good working order, so far as the biliary function is concerned, and to me it seems inconceivable that they can be the consequence of excessive secretion as an independent condition. As a matter of fact, bilious vomiting is practically the result of violent sickness, due to various causes, an act which of course does tend to promote the discharge of bile, and to force it through the pyloric orifice into the stomach. Bilious diarrhoea may also follow excessive action of the bowels, of different kinds, but chiefly occurs when an obstruction to the escape of bile is suddenly removed, leading to an abundant flow, or as the result of the action of some powerful cholagogue.

3. The phenomena which result from *obstruction of the portal circulation* constitute a separate and definite group of symptoms of the greatest importance in relation to the hepatic apparatus. In contrast with jaundice, they are in the large majority of cases the direct consequence of disease of the liver itself, especially some form of cirrhosis, the ramifications of this circulation in the interior of the organ being compressed or obliterated more or less extensively. The fact must not be forgotten, however, that the portal trunk and its main divisions are liable to be immediately obstructed, either by pressure from without, changes in their walls, or thrombosis and its consequences. Such conditions may be associated with hepatic disease, or are occasionally quite independent. In cirrhotic cases it is highly probable that the portal vein itself is thus obstructed much more commonly than is usually supposed. Another illustration of the necessity for always regard-

ing the hepatic system comprehensively is afforded by primary or idiopathic thrombosis of the portal and contributory veins, which, though exceptional, does occur occasionally. A very interesting and instructive case of this nature is reported by Dr. Bertram Rogers of Bristol.¹

A certain degree of portal difficulty may arise from the side of the hepatic vein, as the result of prolonged congestion from cardiac disease; but until more definite secondary changes are set up in the liver, this can hardly be recognised clinically. When, however, such changes become pronounced in heart cases, the evidences of portal obstruction may be a predominant clinical feature. It may be remarked in passing that obstruction of the hepatic venous system from cardiac back pressure cannot be recognised by any definite symptoms, but it is sometimes indicated by what should be regarded rather as a physical sign, namely, the "pulsation" presented by an enlarged liver.

I do not propose to discuss in detail the individual phenomena which may result from portal obstruction, but desire to draw attention to a few practical points. Ascites is of course by far the most common symptom of a definite nature coming under this category, and it is often the first positive manifestation of the existence of hepatic disease. As a rule, it is essentially chronic in its onset and course; but it is remarkable how acutely it may set in sometimes, for no obvious immediate reason, in cases where no doubt the morbid changes in the liver have been of long duration. Very rapidly developed ascites may follow portal thrombosis, and this may be the explanation of some of the cases just alluded to. It used to be thought, and indeed is a very prevalent belief to-day, that peritoneal dropsy following portal obstruction is practically a hopeless condition, and *prima facie* it certainly looks as if such were the fact. I have, however, pointed out in previous writings on the subject that the fluid may be got rid of, not only temporarily but permanently, by treatment in not a few instances, although the obstruction remains as a permanent condition, the blood returning by other channels. I believe that one explanation of the difficulty experienced in treating ascites successfully is that the circulation through the portal trunk and its main divisions is directly interfered with, either by thrombosis or pressure by fibrous thickening; and that the outlook is much more hopeful if the obstruction is entirely confined to the branches in the liver itself. Another difficulty no doubt arises from the development of chronic peritoneal changes, especially after repeated paracentesis, which in course of time may become very pronounced.

I have been surprised to find that it is by no means an uncommon notion that œdema of the legs is one of the direct consequences of portal obstruction. Of course, this is an entirely erroneous idea, but it is important to bear in mind that consider-

¹ *Bristol Med.-Chir. Trans.*, June 1899.

able anasarca, or even œdema of the abdominal walls, may occur as a secondary event, due to pressure of a large peritoneal accumulation upon the inferior vena cava and iliac veins, which completely disappears after paracentesis. In exceptional instances, however, œdema of the legs becomes permanent in cases of cirrhosis or malignant disease of the liver, as the result of compression of the inferior vena cava by fibrous thickening or a growth. When ascites is an outcome of hepatic changes secondary to cardiac disease, it naturally as a rule follows anasarca, but not invariably. Moreover, I have met with some striking cases of cardiac dropsy, which, beginning in the ordinary way, have ultimately become cases of mere extreme ascites, the external œdema disappearing entirely. This course of events must obviously indicate that the secondary hepatic changes have become very pronounced.

Dilatation of the superficial veins varies a good deal in its degree and extent in cases of portal obstruction. As already indicated, it usually follows an abundant ascites, but not always; and the enlarged veins will probably remain after this condition has been quite cured by treatment.

Hæmorrhage into the stomach, intestinal canal, or both, is a most important result of portal obstruction, and I do not think that its gravity is always appreciated as it ought to be, though, of course, it may be slight or moderate in amount. Gastric hæmorrhage is the usual event, which may be immediately due to different lesions, and if not at once fatal, is revealed by hæmatemesis, followed by melæna, some of the blood passing through the pyloric orifice into the intestines, and being ultimately discharged per anum in its changed form. The following points of practical interest have been exemplified by cases which have come under my observation. Profuse hæmatemesis may be the first definite symptom revealing the presence of advanced hepatic cirrhosis, perhaps not even suspected, but clearing up the significance of previous attacks of so-called "indigestion," "biliousness," and what not. I have known this event occur in the case of females addicted to secret drinking. The hæmatemesis may prove fatal, but it is remarkable what an amount of blood may be lost, and yet recovery take place. In other instances the hæmorrhage supervenes in a case of extreme ascites, indicating grave portal obstruction, which shows the danger of delay in performing paracentesis under such circumstances—a lesson I was once severely taught by a case under my care at University College Hospital. A man was admitted for ascites from cirrhosis, of large amount, but as there did not seem to be any immediate urgency, I, for certain reasons, postponed tapping until the following day. Early in the morning, however, profuse hæmatemesis suddenly set in, almost immediately terminating fatally. Again, ascites may be entirely cured, and death result from gastric hæmorrhage after a variable interval. A very interesting and instructive case of this kind happened in

the practice of the late Dr. Young of Rome, when he resided in Florence. Acting on my suggestion, he performed paracentesis for extreme cirrhotic ascites due to alcohol, when the patient was almost moribund, in spite of the strongest protests from other medical men who were in consultation. The result somewhat astonished them, and was most satisfactory, for the peritoneal dropsy was completely cured by the single tapping. I saw the patient some six weeks afterwards in my consulting-room in London, when his cirrhotic liver could be felt as plainly as possible, and I duly warned him as to his habits. However, he was subsequently seen by a "fashionable physician," who informed him that there was nothing the matter with his liver! Consequently he resumed his intemperate habits. There was never any return of the ascites, but Dr. Young informed me that the patient died some three years afterwards, suddenly, from hæmatemesis, while sitting at the dinner table!

With regard to independent intestinal hæmorrhage, according to Frerichs it is specially liable to occur after portal thrombosis, giving rise to a bloody diarrhœa. Such hæmorrhage, which may prove fatal, is also met with in that rare class of cases in which clotting takes place in the mesenteric veins and their tributary branches before they join the portal system.

The direct connection between hæmorrhoids and some difficulty affecting the portal circulation, whether it be merely "sluggish" or actually "obstructed," is an idea very generally accepted, and it must appear the rankest heresy to cast any doubt upon it, especially when bearing in mind the anatomy of the venous circulation. I venture to affirm, however, that in the large majority of cases of piles, the "liver" at any rate does not deserve the sole blame usually attached to this organ, but that other much more definite cause or causes can be found, which partly or entirely account for the condition. I can affirm, moreover, from personal observation, that in the most extreme cases of hepatic cirrhosis with portal obstruction I have ever met with, hæmorrhoids were conspicuous by their absence. Nor does there seem to be any valid reason for thinking that piles associated with portal difficulties are specially liable to bleed.

The pathological relations of the spleen to the hepatic system are highly interesting and important. I cannot, however, discuss them here, and will only call attention to the definite connection between enlargement of this organ and portal obstruction.

4. *Alimentary canal.*—Apart from the more definite phenomena already discussed, the consequences of pronounced biliary disorders or portal obstruction, a number of vague symptoms connected with the alimentary tract are commonly attributed to the "liver." They include more or less anorexia, or depraved appetite; an unpleasant or bitter taste; a large and thickly furred tongue; a turgid, congested condition of the mouth and throat, with formation of much

viscid mucus; offensive breath; epigastric discomfort or tenderness; nausea, vomiting, or retching, especially in the early morning; flatulence and eructations, or the passage of much foul gas per anum; acidity and heartburn; constipation, diarrhœa, or irregularity of the bowels, with unhealthy stools. That affections of the hepatic system, taken as a whole, may act injuriously upon the alimentary canal, cannot be doubted for a moment, and they may not only originate symptoms but also actual morbid changes, such as congestion of the mucous membrane, catarrh, or even more serious conditions. These may be set up by mere biliary derangement, quite apart from actual jaundice; from more or less sluggishness or congestion of the portal system, not sufficient to produce the more characteristic manifestations of portal obstruction; and in all probability from disturbance of hepatic functions other than the biliary. Moreover, it may be noted that interference with the portal circulation will sooner or later affect the pancreas; and, according to Mayo Robson, chronic pancreatitis is often associated with gall stones. Any secretory disorders associated with this organ, thus set up, must necessarily tell upon the digestive process in the intestinal canal. But, granting all this, I affirm unhesitatingly that the very prevalent tendency to attribute the phenomena I have mentioned to "the liver," especially its "functional disorders," to "biliousness" and the like, has in the majority of cases no reliable foundation, and is often absolutely wrong and misleading; as a matter of fact, they are quite commonly due to some definite morbid condition of the digestive tract itself, either local or more or less diffuse. This may be accompanied with hepatic disease or disorder, but the liver is in many instances perfectly normal in every respect. I have known many serious gastric cases, even cancer, treated for "liver"; and indeed the historical case of Napoleon I. is a prominent illustration of this point. But beyond this, the alimentary canal is often being persistently injured by the same causes as those which are damaging the hepatic structures, particularly errors in diet and alcoholic excess, and yet this aspect of the case is entirely ignored. There seems to be a general impression that the digestive tract can stand anything, and the pathological changes which must inevitably result sooner or later from the direct and repeated action of what are really strong irritants are often altogether forgotten or disregarded. The injurious treatment accordingly directed to the liver adds to the irritation. With regard to the mouth, though usually very pronounced in cases of jaundice, the phenomena associated with this region, attributed to the liver, are frequently due to obvious local causes, such as complete neglect of cleanliness or attention to the teeth, or bad teeth; or to habits, not forgetting, in addition to alcoholism, excessive smoking, or an irrepressible fondness for nasty medicines. I have on not a few occasions been astonished and amused to hear a medical man deplore in a despondent tone

how he "had done his utmost to clean the tongue by acting upon the liver," but without any effect, when the "furred tongue" had evidently nothing whatever to do with this organ, and his efforts in this direction must inevitably lead to disappointment. The bitter taste, which may be associated with jaundice, or is complained of independently, demands a word of special comment. It has been generally supposed to be directly due to bile, but observations by Brunton and others seem to show that freshly secreted bile is not bitter. Substances are found in the intestines during digestion which are bitter; these are absorbed by the portal system and conveyed to the liver, where they are turned back, and again excreted with the bile, which thus acquires its bitter taste. If the power of the organ to arrest these substances is exceeded, some of them get into the general circulation, and a bitter taste may probably be thus accounted for in some instances.

In certain acute diseases of the hepatic system, of a grave nature, the alimentary canal is liable to be prominently affected, and the tongue may assume a typhoid character, or a red and glazed aspect. These phenomena are, however, evidences of the general effects of these complaints, and have no local significance. In cases even of advanced chronic liver disease it by no means follows that this canal is in any way disturbed, and I have met with numerous instances in which morbid changes seem to have almost entirely destroyed the structural and functional integrity of the organ, and to have caused marked portal obstruction, and yet the stomach and intestines performed their work in a most satisfactory manner in every respect; the appetite was excellent; and the tongue presented a perfectly healthy appearance. I have such cases under my observation at the present time.

5. *General and remote symptoms.*—In the introductory remarks to this article, I ventured to criticise the prevalent irrational tendency to attribute to "the liver" all sorts of symptoms, general and remote, subjective and objective, which have no direct connection with this organ. That an important practical relationship does exist between these classes of phenomena and the hepatic system should of course be fully recognised, but I must here again emphatically insist upon the necessity of always exercising particular caution in dealing with this aspect of a case, and of regarding it with some measure of intelligent consideration and common sense. It is impossible to discuss the subject satisfactorily within a limited space, and I can only offer a few general comments.

(a) In certain forms of pronounced liver disease, either with definite local symptoms, or only recognised by physical examination, the absence of general symptoms may be of great significance in diagnosis.

(b) The presence, degree, and course of one or more of the ordinary objective general symptoms or conditions common to all structures are, on the other hand, in many instances of

essential diagnostic importance. Special attention should be paid to pyrexia, septicaemia, wasting, anaemia, a sallow or cachectic appearance, and a tendency to purpuric hæmorrhages. With these may be associated corresponding subjective sensations of languor, fatigue, weakness, and the like. In some obscure cases of gall stones, hepatic abscess, or pylephlebitis, febrile or septic phenomena are of peculiar significance. The wasted, sallow, cachectic appearance of a patient suffering from advanced cirrhosis, with the enlarged venules on the face, is often strikingly characteristic. It is remarkable, however, how well cirrhotic subjects may look, or how they may improve under treatment in aspect and condition. In this connection it must be noted that general symptoms associated with disease of the hepatic apparatus are in many cases due, not so much to the local trouble, if at all, as to the very nature of the disease, such as cancer, which may also affect other parts at the same time; or to the constitutional condition of which it is a manifestation, such as malarial cachexia or syphilis. I am afraid that loss of flesh, and weakness, attributed to the liver, are sometimes due to the active lowering treatment practised, with the view of setting this organ right.

(c) The general symptoms indicative of collapse are likely to accompany the passage of gall stones; and are now and then the result of sudden grave lesions of the liver or gall bladder.

(d) The phenomena included under the term *cholæmia* are of a special nature, and no doubt are the manifestation of a peculiar toxæmia, whatever its exact nature may be. They may or may not be associated with jaundice, and are by no means in proportion to its degree, when it is present.

(e) Of the various subjective sensations, or disturbances of functions—cutaneous, nervous, circulatory, respiratory, or associated with the special senses—which are referred to the liver, it is impossible to speak in any definite manner. When there is marked jaundice, we expect certain feelings to be complained of, such as itching, lassitude, debility, mental depression, and possibly yellow vision; and the presence of bile in the blood does undoubtedly tend to depress the action of the heart, it may be seriously. It is highly probable that general or remote symptoms may result from interference with other hepatic functions besides the biliary, and the phenomena regarded as due to lithæmia are thus explained by many pathologists, as well as certain other supposed toxic conditions. The precise relation of the liver to attacks of “sick headache” and allied conditions is difficult to determine, and probably differs in different cases. That head-symptoms may be due to this organ is likely enough in certain cases. “Specks before the eyes” are very commonly attributed to functional hepatic disorders, but on no adequate grounds. They may certainly have an altogether different explanation. I have heard a “liver cough” sometimes spoken of, but apart from the

physical effects of a "big liver," or certain special lesions, there is no foundation whatever for such a notion. Not only may cutaneous sensations be associated with hepatic troubles, but different eruptions may no doubt be thus originated. A form of xanthoma follows prolonged jaundice in rare instances, of which I have only met with one example.

6. *Changes in urine.*—That the urine has important physiological and pathological relations to the hepatic system, cannot be doubted, but in this direction again there is a tendency to superficial and hasty generalisations and conclusions, on unreliable data, and not warranted by facts. This excretion is often perfectly normal in every respect when the liver is in a state of advanced disease, and appears to be to all intents and purposes quite incapable of performing any of its functions. At the same time, it ought always to be intelligently studied, within due limits, in connection with both functional and organic affections of the hepatic apparatus as a whole. The more scientific investigation of the urine will be referred to presently, and here it will suffice to point out the chief objective changes which are regarded as having a symptomatic relation to this system. The most definite are of course those due to admixture of bile, more or less evident and characteristic in proportion to its amount. An unusually dark colour of urine, produced by certain pigments, has also been attributed to the liver. The abnormal condition most commonly referred to this organ, is discharge of excess of uric acid, giving rise to a deposit of this substance or of urates on standing; an abundant precipitation of "pink lithates" being looked upon as specially significant. No doubt such an association does often exist, but to attribute deposit of lithic acid or lithates to the liver in all cases is manifestly wrong and misleading. With reference to portal obstruction, another erroneous notion which I have sometimes come across is that such obstruction directly impedes the renal circulation, and so interferes with the proper secretion of urine. While warning against this error, it may be worth while drawing attention to the fact that abundant ascites resulting from this cause, by pressing upon the renal veins, does not uncommonly diminish the urinary discharge, and modify its characters, things resuming their normal state after paracentesis. It must not be forgotten that the kidneys are frequently themselves actually diseased along with the liver, or they are affected by the same cause, such as cardiac disease, an important fact to be always kept in mind from a clinical point of view, in relation to any abnormal changes which the urine may exhibit.

7. *Symptoms due to physical interference with neighbouring structures, or to special lesions.*—I need only allude to this group of phenomena very briefly, so as to complete the outline of the symptomatology of the hepatic system, and to draw attention to the necessity of not losing sight of them altogether in certain

cases. Abdominal symptoms may result from the physical effects of a displaced or very large liver or a "hepatic tumour"; of fibrotic changes in the vicinity, associated with cirrhosis or perihepatitis; or of gall stones. The last-mentioned may undoubtedly cause intestinal obstruction, of which I have met with one very pronounced case; and in two cases I have known them lead to dilatation of the stomach and its consequences. Hepatic enlargement in an upward direction may give rise to obvious chest symptoms; and should an abscess or hydatid cyst rupture in this direction, they are likely to be very prominent. When a communication forms with the lung, cough with characteristic expectoration ensues. A liver abscess or purulent collection in the gall bladder may burst into different structures within the abdomen, or on the external surface, with corresponding symptoms. Perforation or rupture of the gall bladder into the peritoneum will be attended with the usual phenomena indicative of such a lesion. An external biliary fistula is occasionally formed, or is left after operation.

B. Physical and other methods of skilled examination.—Skilled examination directed to the hepatic apparatus can be conducted on systematic and definite lines, and I desire now to offer a few practical remarks upon this aspect of its clinical investigation.

1. *Physical examination.*—It would appear reasonable that the first and most obvious step which suggests itself, should there be reason to suspect the existence of any morbid condition of the hepatic system, is to make a personal physical examination from without, by the ordinary methods. Yet my observation compels me to say that, even when symptoms are evident enough, this simple course of procedure is often entirely neglected. And here, again, I must draw emphatic attention to the fact already alluded to, of the frequency with which symptoms are absent or indefinite, while physical examination at once reveals some more or less serious disease. I have been greatly struck by the number of cases of hepatic cirrhosis which are practically latent, or spoken of as "congestion of the liver," but which are thus easily and positively recognised. To find unsuspected gall stones in the gall bladder is, as I have already intimated, not at all uncommon; and sometimes they are in large numbers. In exceptional instances, one comes upon albuminoid disease, a hydatid tumour, malignant disease, a greatly distended gall bladder, or other pronounced morbid conditions, not to mention those of a less serious nature. The lesson as to the necessity of making it a rule to examine systematically, before at any rate jumping to the conclusion that the liver is merely "functionally disordered," is obvious.

It cannot be too strongly insisted upon that physical examination of the hepatic apparatus is, in the large majority of cases, quite easy and simple, provided the investigator has had an average training in carrying out the recognised methods, and in

applying them to the several structures within the abdomen. Any claim to special skill in this direction should always be regarded with suspicion. Morbid conditions of the liver are not infrequently more or less visible on inspection; but palpation and percussion are of course the methods upon which we mainly rely for positive and definite information. Under certain circumstances, and especially if there is much ascites, the procedure known as "dipping" is of much value, for feeling this organ; and at the same time it may be pressed forward from behind. Auscultation is only of direct service now and then, but it must not be ignored altogether, and of course it is of material help when the liver encroaches upon the thorax. Assuming that physical examination is being carried out, here again comes in the essential importance of regarding the hepatic system comprehensively, and not fixing attention solely and exclusively on the liver. At any rate the gall bladder should never be forgotten, for it is not uncommonly affected independently, or is involved along with this organ. With regard to gall stones, which should always be particularly borne in mind, not only may they be detected in the gall bladder, but, in exceptional instances, I have felt one lodged in the duct. It is hardly possible to make out any morbid condition of the portal vein by direct examination, though, of course, the prominent effects of its obstruction—ascites and enlarged spleen—are thus recognised. I have never personally met with any case in which aneurysm of the hepatic artery or enlarged glands in the portal fissure could be detected by physical examination; but such conditions might possibly be made out during life under favourable circumstances.

The limitations of this article will not permit any detailed discussion of the physical examination of the liver and gall bladder, which are the structures with which we have practically to deal in the ordinary run of cases; and it must be taken for granted that any one who peruses it is familiar with the normal physical signs, as well as with those of the chief diseases to which these structures are liable. It need scarcely be said that in health the gall bladder cannot be felt. Without further comment, I submit, in tabular form, what I think may be regarded as a practical arrangement of the abnormal conditions to be looked for and studied in relation to the liver and gall bladder respectively, from the point of view of physical examination:—

1. LIVER.

(1) Displacement or Malposition—

(a) Simple.

(b) With increased mobility.—Floating Liver; Ptosis of Liver.

(2) Abnormal fixation by adhesions.

(3) Alteration in shape or marked deformities, due to external pressure, by tight-lacing, belts, occupation, etc.; or sometimes probably congenital.

(4) Changes due to disease—

(a) In size :

(i) Enlargement.

(ii) Diminution or contraction.

(b) In outline and shape.—Change in general contour ; various superficial irregularities ; depressions or scars ; local prominences or protuberances ; umbilication.

(c) In tactile characters.—Increased consistence or firmness ; marked hardness or induration ; abnormal softness, sometimes with sense of pitting ; local feeling of elasticity or fluctuation.

(d) Special signs :

(i) Pulsation, associated with the hepatic venous system.

(ii) Friction fremitus or sound, elicited by respiratory movements.

(iii) Hydatid fremitus.

(5) Various combinations.

2. GALL BLADDER.

(1) Slight fulness or enlargement.

(2) Marked dilatation or distension with fluid.

(3) Hypertrophy or thickening of walls, with dilatation.

(4) Adhesion to neighbouring parts, with enlargement.

(5) Accumulation of gall stones.

(6) A solid mass, due to morbid growth or other conditions.

There are a few practical points to which I desire briefly to refer, relating to physical examination of the hepatic system, and what it reveals.

(1) While fully appreciating the necessity and essential value of this method of investigation, the practitioner must be prepared to meet with negative results, even though symptoms are prominent, and this may be an important factor in diagnosis. Moreover, he must always be on his guard against making too much of what is thus discovered, with respect to the liver, and forming hasty conclusions without due deliberation. When this organ comes to an unusual extent below the margin of the thorax, as determined by palpation and percussion, undoubtedly the general tendency is at once to conclude that it is "enlarged," in proportion to the level to which its lower border reaches. Should it happen to be altered in shape at the same time, a very grave diagnosis will probably be arrived at. As a protest against such tendencies, I must draw emphatic attention to the malpositions and changes in shape mentioned in the foregoing table, but more especially to hepatic displacement in a downward direction. The frequency with which I have known such displacement, even when obvious enough, mistaken for enlargement, has forced upon me the conviction that it is seldom even thought of, and in the conclusions formed by certain writers the same error is evident. Now, as a matter of fact, depression of the liver from various causes, while at the same time its normally upper surface becomes more anterior, is of very common occurrence. Indeed, I have often known it come down to, or even below, the umbilicus,

and yet be perfectly healthy in its structure. Further, when the organ is enlarged, it is frequently more or less displaced at the same time, and unless this combination is recognised, a much exaggerated idea is formed as to its actual size. This statement applies particularly to cases in which the hepatic conditions are secondary to intrathoracic diseases. Unfortunately a wrong diagnosis in this direction usually leads to energetic, but quite uncalled for and probably mischievous treatment, for it seems almost impossible to resist the temptation to try to reduce a supposed "big liver" to its normal size by "active measures!"

The pronounced "floating or wandering liver" is only exceptionally met with, but it must not on that account be altogether forgotten—a lesson which I was taught many years ago by a case in which I made a wrong diagnosis as to the nature of an intra-abdominal "tumour," from having at that time had no experience of the condition from personal observation. The reader may be referred to an abstract of an interesting communication on "floating liver" by Dr. Max Einhorn¹; and also to a clinical lecture by Treves² on what he terms "ptosis of the liver," signifying a sinking down or dropping of the organ in the abdominal cavity, with certain changes in shape.

Displacement of the liver in an upward direction occurs in connection with certain abdominal conditions, but no difficulty in diagnosis ought to arise under such circumstances. Sometimes all signs of the organ in front disappear; in other instances extension of dulness towards the chest reveals its abnormal situation.

(2) Should enlargement of the liver be definitely made out, and as a rule it can be readily recognised when present, further investigation is always demanded, on systematic lines, in order to determine its actual nature and significance, so far as this is possible. To rest content with a mere diagnosis of "enlarged liver" is wholly inadequate. It must be borne in mind that the increase in size may be due to more than one morbid change. The chief points to be noted are, whether there is tenderness on pressure or not, with its degree, if present; the extent and directions of the enlargement; its outline and shape, whether normal and smooth, or presenting any of the irregularities mentioned in the table; its tactile characters; and whether it exhibits any special signs. In certain cases the subsequent course of events must be taken into account, any changes which hepatic enlargement undergoes while under observation being duly studied. In this connection it is important to remember that the increase in size may take place mainly or even entirely towards the chest, especially in cases of hydatid tumour or abscess, which is made out practically by examination of this region in the usual way. Such examination should not, however, be carried out in a casual manner, and attention to minor details may be of conspicuous service in

¹ *Clin. Journ.*, London, Oct. 4, 1899.

² *Lancet*, London, 1900.

arriving at a positive diagnosis. For instance, not long ago I was able to express a confident opinion as to the existence of a hydatid tumour of the liver encroaching upon the thorax, by noting—(1) that a feeling of fluctuation could be detected by placing the hand over the ribs posteriorly, and tapping with the fingers gently in front; and (2) that although at first it appeared as if there was absolute dulness extending a considerable way up the chest, with loss of the usual pulmonary signs, more careful investigation showed that there was still some degree of resonance on percussion, and a definite though weak breath sound was audible to the extreme base, proving that some lung tissue intervened between the source of dulness and the surface. The correctness of the diagnosis was proved by a most successful operation. The supposed convex outline of the upper border of the dulness due to enlarged liver encroaching upon the thorax, while worthy of attention and consideration, cannot always be relied on in practice.

When enlarged liver is associated with pronounced jaundice, particular care must be taken to determine its real nature. Here again the tendency is to refer the jaundice to hepatic mischief, when the increase in size may be merely the result of obstruction in the hepatic or common duct, with consequent accumulation of bile.

Neighbouring conditions which are known to simulate hepatic enlargement must be duly taken into consideration in any doubtful case, both abdominal and thoracic; and it must not be forgotten that they may be combined in the same case. As bearing upon this point, and also as affording another striking illustration of the importance of always regarding the hepatic structures comprehensively, the reader is referred to a most interesting and practical communication on "Supra-hepatic abscess" by Cantlie.¹ He describes the condition as "the formation of pus between the layers of the broad ligament of the liver," and speaks of it as "that form of so-called liver abscess which arises independently of dysentery." Another condition to be specially borne in mind is subphrenic abscess on the right side.

(3) Diminution in the size of the liver need only be very briefly noticed, but it must not be forgotten in relation to physical examination. In all probability the organ cannot then be felt, which materially adds to the difficulty in diagnosis of certain cases of atrophic cirrhosis in young subjects, simulating tuberculous disease of the peritoneum. Under such circumstances, as well as in acute yellow atrophy, the contraction or shrinking of the liver can only be determined positively, if at all, by the diminution or absence of hepatic dulness. I am convinced, however, that a cirrhotic liver which is distinctly contracted or "atrophic" can, not uncommonly, be clearly made out by palpation through the abdominal wall, and its characteristic features thus fully appreci-

¹ *Brit. Med. Journ.*, September 9, 1899.

ated. Here, again, I must protest against the fallacy of supposing that because the organ can be felt below the margin of the thorax, it must be of necessity enlarged. One other point may be noted, namely, that in some instances the liver is not really altered in size in one direction or the other to any appreciable degree, but careful palpation reveals physical signs, as regards shape and tactile characters, which demonstrate that the organ is organically diseased, it may be seriously.

(4) The gall bladder should always receive particular and independent attention, and it is necessary to be prepared to find this organ affected while the liver is perfectly normal. Its less pronounced morbid conditions can only be made out by very thorough and careful digital examination, if at all, but they certainly might be more frequently detected than they are, if systematically looked for, and I specially allude to suspicious cases of gall stones. In not a few instances the signs are quite distinct and definite; and it is remarkable what a large collection of these bodies may be found on examination, the existence of which has entirely escaped observation, accompanied, it may be, with marked tenderness. A most interesting but uncommon class of cases are those in which the cystic duct is blocked by a calculus, followed by accumulation of fluid in the gall bladder, with distension, until ultimately a cyst of considerable dimensions may be formed. It is usually free from tenderness; and absence of jaundice is a striking feature. I happened to have two such cases under my observation within a short period, which were successfully operated upon. With regard to the feeling of a solid mass associated with the gall bladder, gall stones generally constitute one factor, which may accompany either fibroid thickening or malignant disease, and it is important to bear in mind the fact already mentioned, that the latter may be secondary to these bodies. As a rule this viscus, when enlarged, is more or less movable from a fixed point under the liver edge, but in certain conditions it becomes adherent and cannot be altered in its position, which may lead to some difficulty in diagnosis.

(5) When prominent symptoms are present, indicating obstruction of the bile ducts or portal system, or both, physical examination of the abdomen must be directed not only to the hepatic system itself, but to the detection and investigation of morbid conditions in the neighbourhood, which might interfere directly with the common duct or the portal trunk. From this point of view the pancreas is an important organ to be always kept in mind.

2. *Examination of urine and fæces.*—In addition to the general observation of the urine and fæces already discussed, it may be necessary, in relation to the clinical investigation of the hepatic system, to examine the discharges chemically and microscopically, but more particularly the former. There is at the present day a tendency in some quarters to exaggerate the value

of this line of investigation, and to claim for it a predominating importance over other methods. While fully appreciating the help it affords in suitable cases, I have no hesitation in affirming that, in the large majority of instances, there is no occasion for any elaborate procedures, and all that may be required is fully within the capacity of any well-trained practitioner. To what extent they may be called for in particular and exceptional cases must be left to individual inclination and discretion.

With regard to the urine, the chief abnormal conditions to be looked for in connection with hepatic affections are—

(a) The presence of *bile*, which may be detected in small quantity in certain cases where there is no evidence of jaundice. It has been affirmed that bilirubin may be formed in excess in connection with disordered liver function, and found in the urine.

(b) Excessive discharge of *uric acid* and *urates*, which it may sometimes be worth while to test quantitatively, microscopical examination being also indicated when deposits form.

(c) Deficiency, or, on the other hand, excess of *urca* under different circumstances, according to some writers. It has been affirmed that the former is due to organic disease, the latter to functional disorder of the liver.

(d) *Glycosuria*.—Whatever be the exact pathology of sugar in the urine, there can be no doubt that in many instances it has an important relation to the glycogenic function of the liver. There is no definite connection, however, between glycosuria and any particular organic disease, and sugar is seldom present even in the most serious and advanced hepatic affections.

(e) *Albuminuria*.—This condition is believed to be one of the effects of functional derangement of the liver, and probably with reason. At the same time, caution is always necessary in referring albuminuria to this cause; and it is particularly important to remember that it may be indicative of renal disease, even when there is hepatic trouble, while the liver and kidneys are not uncommonly the seat of similar structural changes. Temporary albuminuria is a definite result of pressure upon the renal veins by abundant ascites, due to portal obstruction.

(f) *Leucine and Tyrosine*.—The presence of these substances in the urine is specially associated with acute yellow atrophy, but they are not invariably found in this complaint.

It would not serve any useful purpose to attempt to discuss here the special examination of the stools in relation to the hepatic system. The abnormal characters and changes associated with the absence or deficiency of bile in the intestinal canal demand attention, and the faeces are then unusually offensive. Unaltered bile pigment is not found in healthy stools, and its presence is always abnormal. Whether interference with the biliary functions accounts to any degree for the discharge of undigested fat or other elements of food is a doubtful point. Examination of the faeces for gall stones

is of course highly important, and it might be necessary to further investigate supposed bodies of this nature chemically and microscopically. In exceptional instances a discharge of pus from the hepatic apparatus takes place by the bowel; or hydatid structures may be discovered in the stools.

3. *Use of the Röntgen rays.*—This modern method of clinical investigation can be applied to the hepatic apparatus with advantage in certain cases. I have personally been more than once indebted to it for confirming or clearing up a difficult and uncertain diagnosis; and there can be no doubt but that we may anticipate valuable help in this direction in an increasing degree, with enlarged experience, and in proportion as skiagraphy becomes more systematically employed, and more definite and reliable in its results.

4. The hepatic system affords a conspicuous example of the essential service which may be rendered for diagnostic purposes by *operative procedures* of different kinds. The result may be negative as well as positive, and, in illustration of this fact, I have already mentioned an interesting and instructive case of supposed gall stones where none were found. In not a few instances the operation merely confirms a diagnosis previously made, and is a preliminary to further measures in the way of operative treatment. I do not propose to intrude upon the domain of the surgeon by attempting any discussion of the procedures that may be called for under different circumstances; and having called attention to the subject, in order to complete the summary of the clinical investigation of the hepatic apparatus, I must refer the reader to surgical works for further information. I will merely remark that some discretion is necessary in having recourse to any serious operation, and it should not be practised unless there is a reasonable expectation that it may lead to some practical advantage in the way of treatment.

CONCLUDING REMARKS.—When I started preparing this article, the primary object I had in view was to endeavour to counteract the erroneous, and what I must regard as highly mischievous, ideas prevalent about morbid conditions of the liver and their manifestations; and to claim for the hepatic system, as a whole, rational consideration and methodical examination, founded on intelligent knowledge and adequate skill. I have, however, been led into a discussion of various points, especially relating to the clinical phenomena connected with this system, and their practical investigation. I now venture to affirm that, with due attention to the etiological and clinical facts bearing upon any individual case, it seldom happens that a confident and sufficiently accurate diagnosis for all practical purposes cannot be made. Occasionally, of course, difficulties arise, and even puzzling conditions are met with, especially in connection with the liver itself. In very fat subjects

it is not uncommonly quite impossible to make a satisfactory local examination, and we have to come to a conclusion on other data. Difficulty may further occur from the rarity or unusual character of a hepatic disease, which is evident enough; from the combination of two or more morbid conditions; or from a want of a clear and definite etiological and pathological history, of which I have recently had a conspicuous example. I should have liked to have completed this communication by discussing the treatment of hepatic complaints from a comprehensive standpoint, but for the reason already stated I must leave this aspect of the subject for a future occasion. I will only remark once more, in conclusion, that I do not desire in the least to under-estimate the importance of "functional disorders" or "minor ailments" connected with the hepatic system, which, if neglected, may unquestionably lead to more serious troubles. Most of these can be prevented or remedied by attention to diet, drink, exercise, and habits generally. I dare say, however, that the majority of people are none the worse for an occasional clearing out of the biliary apparatus by some efficient "cholagogue," especially a bile expellent; or for a dose now and then of some preparation which stimulates a sluggish portal circulation, or acts as a "portal depletant." It is against the habitual and irrational employment of such measures, for no adequate reason, that I must once again emphatically protest.

THE TREATMENT OF THE COUGH IN PULMONARY CONSUMPTION.¹

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To the lay mind the main characteristic of pulmonary consumption is the cough, and it is possibly in consequence of this that phthisical patients are exposed to such indiscriminate drug treatment for the relief of this symptom. My excuse for writing on such an exceedingly trite subject is the conviction, acquired by watching students at St. George's Hospital and qualified men in my out-patient room at the Brompton Hospital for Consumption, that a considerable number of medical men are apt to treat a cough in a phthisical person with a large variety of drugs, without making any very careful investigation as to its cause. It is a common experience for me, after asking even a qualified man to examine a patient complaining of a cough, to be told that although there are no physical signs of any pulmonary disorder in the chest, an expectorant mixture would not be amiss. I generally ask whether the throat has been examined, and often find that, although no

¹ Read before the Cambridge Medical Society, March 1901.

such examination has been made, some condition is present in that situation which amply explains the cough. This is but a crude example of the necessity there is for carefully searching after the cause which gives rise to this distressing symptom, and for avoiding the routine practice of assuming that it results from irritation of the lungs. My conviction, that we are apt to treat a cough without sufficient consideration, was strengthened when I referred to one of our leading text-books on general medicine for some information on this subject. The whole of the information there given is reproduced in the following sentence:—"The cough of phthisis must be combated by the usual remedies; most prescriptions contain a small dose of opium or morphia, together with tolu, aniseed, benzoic acid, or some other of the so-called expectorants." Such a view is to my mind most pernicious, and one which does incalculable harm to the victims of tuberculosis. Whitla shows a more enlightened and scientific judgment when he says: "There can scarcely be instanced a greater mistake in medical practice than the routine treatment of pulmonary consumption by cough mixtures. The use of the various expectorants and anodynes, which unfortunately constitute the chief portion of the antiphthisical armamentarium of some physicians, only leads to destruction of appetite, disordered digestion, increase of sweating, and all the numerous ills resulting from retained secretion." In a large number of cases of pulmonary tuberculosis, the cough, although to some extent dependent upon the diseased condition, arises from other contributory causes which are well within our power of prevention. I may cite, as an example of this, the cough which often ensues when a patient gets into a bed, the sheets of which are cold. Such cases are obviously not benefited by liberal doses of expectorant mixtures. In another large group, the cough is due to accidental causes which have comparatively little to do with the original disease, causes such as a smoker's throat, chronic granular pharyngitis, and the like. In other cases, however, especially in the more advanced ones, the cough is directly dependent upon the disease. In these it is often useful, and may, in selected instances, be encouraged; but we must remember that even in these cases the cough may arise from a variety of causes, in the treatment of which drugs may play but a small part. For instance, I saw recently a young girl in the last stages of tuberculosis, who was almost entirely prevented from sleeping by the frequency of her cough. She had been dosed with anodynes, but the only effect they had had was to completely upset her digestion. Her cough was due to pleuritic inflammation, and practically subsided when her chest was securely strapped.

The cause of the cough which occurs in the course of pulmonary consumption may then, I think, be grouped under the following headings:—(1) Reflex irritation, especially from sources other

than the air passages, without any need for expectoration. (2) The necessity of removing accumulated fluid. (3) Causes other than, though often dependent upon, the original disease.

Naturally, the divisions of this classification, as in all other classifications, overlap one another, but my meaning will be made clear if I give a few examples.

All forms of cough are, properly speaking, reflex, but as causes of (1) reflex irritation—in the somewhat restricted sense I am adopting—I may mention exposure to sudden differences of temperature, such as going from a hot sitting-room to a cold bedroom; exposure to wind or dust; exertion, such as rapid walking, talking, and the like. If a patient walks quickly, not only does he run the risk of being overheated, but he is very liable to bring on an attack of coughing. Other causes of this form of cough are pleuritic irritation, or dryness of the throat—this latter brought on, perhaps, by the exhibition of belladonna for night sweats. Again, we not infrequently meet with cases in which a distressing cough comes on after taking food, and ends in vomiting. This may be due to various conditions of the stomach, which set up reflex cough by exciting the endings of the vagus nerve; or, on the other hand, it may be due to tenacious mucus tickling the fauces. As examples of (2) “the necessity of removing accumulated fluid,” I may cite the morning cough of phthisis, which is due to the accumulation of the expectoration during the night, or the cough in advanced cases which is brought on by the accumulation of material in phthisical cavities, or by a sudden change of position. Among (3) causes other than, though often dependent upon, the original disease, may be mentioned chronic catarrh of the pharynx, which, in my experience, is the main cause of cough in a surprisingly large number of individuals who live in large towns. Other examples are tracheitis, laryngitis, whether tuberculous or not, an intercurrent attack of bronchitis, and the like.

I have said enough, I think, to show that the cough which occurs in phthisical persons is not likely in all cases to be remedied or relieved by means of expectorant mixtures, and that its routine treatment by means of anodynes is not based on very sound reasoning. In other words, our first consideration in treating a cough in a tuberculous patient must be to determine, with an unbiassed mind, what the real cause of the cough is.

In a large number of instances, tuberculous patients have no cough, that is to say, it is not absolutely necessary that a patient suffering from pulmonary tuberculosis should have a cough; in many others, the cough is due to the patient's surroundings and want of care in avoiding the causes which give rise to it. Thus it may be reflex, or it may depend upon inflammation of the smaller bronchioles, brought on by injudicious exposure. Nothing is more certain than that such a cough may be absolutely stopped without

any drug treatment, by placing the patient under suitable conditions. I recently had the good fortune to spend a few weeks at Dr. Walther's Sanatorium in Nordrach-Colonie, and was much interested by the fact that, during the time I was there, I hardly ever heard one of the sixty odd patients cough during the day time; a few of the more advanced cases occasionally had to get rid of expectoration; but this was done without any cough, in the ordinary sense of the term. Many of these cases went to Nordrach with a cough, but this symptom disappeared in a few weeks. Any one who is familiar with *effective* open-air treatment must have noticed this striking result. To my mind it is a very marked object-lesson that, in the treatment of consumption, the best way to cure the symptoms is to improve the general condition and surroundings of the patient. We have much other evidence in the same direction—the effect of cod-liver oil, or of small doses of creasote, the great improvement of all symptoms which often follows upon a poor patient being removed from an unhealthy house, and placed on a generous hospital diet in improved surroundings. Therefore, I maintain that to alleviate a cough, which is in any way dependent upon pulmonary tuberculosis, we must first place our patient as far as possible under ideal conditions for the treatment of the original disease. If we treat the symptom without regard for the disease, we soon find that though the symptom may improve, the disease, in the vast majority of cases, is aggravated.

The ideal conditions for the treatment of consumptives may be summed up as follows:—(1) An absolutely regular life, so arranged that neither the body nor any portion of the body is allowed to become tired or put to any severe strain. (2) Good nourishing food, in sufficient quantity to establish and maintain the normal body weight of the patient. (3) A constant supply of fresh air at a uniform temperature, and the avoidance of all sources of irritation from dust and the like.

These three conditions are essential, but, as regards the cough, the most important thing is, that the patient should never be subjected to any *sudden* change of temperature, or to any source of irritation, reflex or other.

Unfortunately, it often happens that our patients, from one cause or another—such as their occupation, financial position, etc.—cannot live under these ideal conditions even for short periods of time. In such cases we must make the best use we can of our materials, and our patients must arrange to follow the ideal conditions as closely as their circumstances permit. Our main efforts must be directed towards the improvement of their general condition, towards increasing the resistance of the tissue cells to the tuberculous and pyogenic micro-organisms. For this purpose we may have to have resource to cod-liver oil, small doses of creasote, or its improved forms, guaiacol and creasotal, and certain

other so-called specifics. In the case of such patients we may, unfortunately, have to interfere when a cough supervenes, and prescribe various remedies. We must naturally first determine the cause of the cough, and as far as possible adopt such measures as may remove it. If the cough is due to some definite pathological change, we must, before prescribing, always consider whether our medicines will in any way interfere with the digestion, for no case of consumption, in which assimilation is interfered with, can do anything but deteriorate. It may be that we have to decide that the relief of the cough is more pressing than the possible harm to the digestion. For instance, a patient may be steadily losing ground from want of sleep, brought on by a distressing night cough. In such cases we may have to use opium, but we must not forget that we are buying sleep at a price. We must exhaust all measures at our command before using such drugs as opium, chloral, henbane, or bromides. We must be careful in prescribing sweet syrups and the like. If we decide to treat the cough with drugs, we must further decide whether we ought to encourage, or try to diminish, the expectoration.

After having said so much upon the principles which I think we should follow, I may perhaps give a few examples of the treatment of certain forms of cough by means of drugs. The cough which occurs first thing in the morning, and is accompanied by expectoration, is useful, and must never be checked by a sedative. We can aid this form of cough by giving some warm drink, such as milk or tea, to the patient before he rises. Or we may give a little rum and milk—a dessert-spoonful of rum to a claret glass of warm milk; or we may prescribe some alkaline draught. If this morning cough is accompanied by sickness, as not infrequently happens, we must determine whether the sickness is due to the condition of the stomach or whether it is brought on by reflex irritation of the fauces (by thick mucus and the like), and prescribe appropriate remedies (*vide infra*). In such cases it is important that our patients, in spite of their sickness, should take a satisfactory breakfast. When we have to deal with the dry hacking cough, which is so common in phthisis, we must first make certain that the upper air passages—which, in my opinion, play such an important rôle in the etiology of tuberculosis—are free from suspicion. If we find some form of inflammation in this situation, we must treat it. Personally, I am not in favour of inhalations, at any rate of those inhalations which involve the use of hot fluids, as I hold that it is most important that the air passages should, as far as possible, be protected against any sudden change of temperature. I have no great faith in respirators charged with oil of eucalyptus and the like. Respirators, however, are most useful in removing the cause of some forms of cough; for instance, in such trades as hairdresser, baker, etc. The chronic granular pharyngitis, which is often the cause of this

dry cough, is best treated with some such mixture as the following:—

R					
Iodi					5-20 grs.
Pot. iod.					20-75 „
Olei menth. pip.					1- 3 minims.
Glycerin ad					1 oz.

M.

S.—To be painted over the back of the throat night and morning.

Temporary relief may sometimes be obtained in this condition by means of liquorice, cocaine, or morphia lozenges.

A congested throat, in cases in which the tongue is clean and the temperature but slightly raised, is frequently benefited by a mixture containing—

R					
Tr. ferr. perchlor.					10 minims.
Pot. chlor.					10 grs.
Acid. hydrochlor.					5 minims.
Tr. aurant.					$\frac{1}{2}$ drm.
Aq. ad					1 oz.

M.

S.—To be taken three times a day.

If the throat shows no signs of disease, but is simply irritable, the cough is not infrequently relieved by prescribing 20 to 30 grs. of a bromide mixture at night-time, as this undoubtedly acts on the upper air passages as a sedative.

Tracheitis is not uncommon, and often yields to the following mixture:—

R					
Sod. bicarb.					15 grs.
Acid. hydrocyan. dil.					1-2 minims.
Syr. prun. virg.					$\frac{1}{2}$ drm.
Aq. destill.					1 oz.

M.

S.—To be taken three or four times a day.

It may be necessary to add a small dose of morphia to this mixture in some cases; in others, sodium sulphate may replace the sodium bicarbonate.

If the cough is due to disease of the larynx, nothing does so well as fresh air at an even temperature. If we are forced to give drugs, we may use a 2 per cent. solution of cocaine in the form of a laryngeal spray, inhalations of oil of peppermint, menthol, and the like, or local treatment with 30 per cent. solution of lactic acid. If the dry hacking cough is due to pleuritic irritation, it frequently yields to appropriate remedies; if the pleurisy is at the apex of the lungs, nothing is better than counter-irritation,

with equal parts of the liquor and tincture of iodine, or by means of a blister; if the irritation is basal, nothing succeeds so well as effective strapping of the lower part of the chest. When we can find no cause for this dry cough, we are sometimes forced to treat it with anodynes, on the same principles as we may have to treat what is described as the irritative night cough. We try some simple linctus, such as—

℞					
Vini ipecac.	.	.	.	.	5 minims.
Spiritus chloroform.	.	.	.	.	2 "
Tr. tolutan.	.	.	.	.	5 "
Succ. limon.	.	.	.	.	15 "
Mucilag. acaciæ ad	.	.	.	.	1 drm.
M.					

S.—To be taken when required.

Or some form of simple lozenge, such as—

℞					
Ext. glycyrrhiz.	.	.	.	.	3 grs.
Olei anisi	.	.	.	.	$\frac{1}{2}$ minim.
Massæ trochisorum acaciæ	.	.	.	.	10 grs.
M.					

If these measures are unsuccessful, we must try codeia, heroin, or some other form of opium. For this purpose the following linctus is as effective as any:—

℞					
Acid. hydrocyan. dil.	.	.	.	.	1-2 minims.
Liq. morphin. acet.	.	.	.	.	3-8 "
Oxymyl. scillæ et aq. āā	.	.	.	.	$\frac{1}{2}$ drm.
M.					

Or we may prescribe trochiscus morphinæ (B.P.), or the trochiscus morphinæ et ipecacuanhæ.

We must not forget, however, that this incessant hacking cough—whatever its origin—is not infrequently kept up by the irritability of the nervo-muscular mechanism of respiration. In such cases, food, stimulants, and nervous sedatives are our best remedies. In cases where the cough is stomachic in origin, we may have to prescribe such gastric sedatives as hydrocyanic acid, or bismuth salts combined with vegetable bitters. In some cases a counter-irritant over the epigastrium is useful, in others a gargle of fresh effervescing soda-water gives relief. When the cough is due to some associated catarrh of the larger bronchial vessels, it is best to promote expectoration for a few days by prescribing some alkaline mixture containing sodium bicarbonate, to which we may add small doses of ammonium carbonate or potassium iodide. If the mucus is peculiarly tenacious, no drug succeeds so well as ammonium chloride in 10- to 15-gr. doses three times a

day—the taste of this medicine being disguised by liquid extract of liquorice, etc. In the later stages of consumption, when excavation is present, it must be our aim to get rid of the matter which accumulates in the cavities and larger tubes. There is no remedy which does this so effectually, and with such benefit to the patient, as creasote in the form of vapour. Small doses of creasote and its derivatives are useful in checking expectoration when this is very profuse. Turpentine may also be given for this purpose. In the final stages of pulmonary tuberculosis we unfortunately have to rely very largely upon opium in some form or another for the relief of the cough and other distressing symptoms.

To sum up, then, I would say that the treatment of the cough which occurs in consumptive patients must be based upon the following principles:—

1. Determine the direct cause of the cough.
2. Place the patient as far as possible under ideal conditions, for building up the tissue resistance and avoiding all causes of pulmonary irritation.
3. Never give drugs until all other measures have failed, and then never without considering the question whether in treating the symptom we are not aggravating the disease.

ON ENLARGEMENT OF THE SPLEEN IN CANCER OF THE LIVER.

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THE physical facts in some cases of cancer of the liver are so conspicuous and unequivocal that the diagnosis is rendered both inevitable and confident. On the other hand, there are numerous cases of the disease in which the physical examination is quite inconclusive, either because no sensible departure from the normal can be appreciated, or—and this is the more frequent event—because the facts discovered are of uncertain significance. Now and then the physician no doubt does see a patient in whom the classical facts of cancer of the liver are presented in unmistakable characters. But in the majority of instances the diagnosis is merely a more or less confident inference founded partly on general symptoms and other considerations, and partly on physical facts of admittedly uncertain import. Experience in this, as in many other departments of medicine, discovers the frequent absence of what is usually called “typical evidence,” and this remark applies both to the facts of physical examination and to the general symptomatology of the disease. It has to be recognised that cancer of the liver may exist without nodulation, with-

out pain, without tenderness, and even without enlargement of the organ, just as it may—and indeed very frequently does—pursue its entire course unaccompanied by either jaundice or ascites. And yet again, physical or other evidence may render the diagnosis of cancer morally certain, though the patient may, and that too for a comparatively prolonged period, experience but little sense of prejudice to his general health. It is therefore practically impossible to rely upon the absence of any individual symptom or physical sign as valid ground for the exclusion of a diagnosis of cancer of the liver. That diagnosis must rest upon a review of all the facts of the case, and may quite well be justified even though one or more of the characteristic features of the disease be entirely absent. Further, it is necessary to remember, what experience soon makes commonplace, namely, that cancer of the liver as a clinical condition is, even in cases not doubtful, attended by physical facts and general symptoms common to it and other diseased states of the liver. Hepatic enlargement is of course a consequence of many morbid processes; nodular projections from the surface of the organ may quite well be syphilitic, and, if only a single one is present, abscess or hydatid cyst is equally with cancer or gumma a possible explanation; and tenderness on palpation is present not only in congestion and cancer, but many other conditions, in consequence of the super-vention of perihepatitis, are liable to be marked by the same event—even amyloid disease cannot be absolutely excepted from this statement. Similarly, jaundice, ascites, local pain, general prostration and loss of flesh, either singly or in combination, may be associated with physical signs of enlargement of the liver from several conditions other than cancer.

It is not, then, on this fact or that fact that the diagnosis can be built, but upon the grouping of the facts, and the cases are not infrequent in which, at least for some considerable time, there is difficulty in deciding on which side the probabilities lie.

Under these circumstances it is not surprising to find a welcome given to any piece of evidence for which diagnostic value is claimed, even though the only precise value attached to such evidence is its power to exclude the diagnosis. Enlargement of the spleen is often claimed to possess this clinical value. It is not infrequent to find statements, almost absolute in their terms, to the effect that this event excludes cancer of the liver from the diagnosis. No doubt such statements are for the most part less the outcome of original observation than the presentation in an abbreviated form, and separated from their context, of generalisations framed by competent authorities on the basis of a large experience. Nevertheless, the conclusion above quoted receives so frequently the support afforded by individual cases, that experiences which show its command to be not an absolute one become of considerable clinical moment.

The statement that the spleen is not enlarged in cancer of the liver is of course sharpened for diagnostic purposes by the frequency with which such enlargement occurs in connection with other diseases of the liver. Thus both organs may be affected with amyloid disease; both may be enlarged in chronic malarial conditions; a splenic tumour is frequent in cirrhosis of the liver; in tertiary syphilis, both organs may be enlarged from amyloid disease, or gummatous formations in the liver, with thickening of the fibrous capsule of the organ, and may be attended with passive congestion of the spleen; hydatids of the liver are often complicated with hydatids of the spleen (Budd,¹ Frerichs,² Murchison³); in multilocular hydatid tumour of the liver, splenic enlargement is quoted as one of the diagnostic signs (Nothnagel,⁴ Murchison, Waring⁵); in pyæmic abscesses affecting the liver, "the spleen," says Murchison, "is frequently enlarged, owing not to obstructed circulation, but to the tendency of that organ to enlarge in consequence of the morbid condition of the blood"; according to the same authority, splenic enlargement does occasionally attend tropical abscess of the liver; and lastly, in cases of long impacted gallstone, it is not uncommon to find some and even considerable enlargement of the spleen (Mayo Robson,⁶ Chadwick,⁷ Waring). Many of the above conditions are doubtless in the majority of instances attended by evidences which make their differential diagnosis from cancer a comparatively easy matter. Yet it will scarcely be denied that individual cases arise under almost every one of these conditions in which such diagnosis is attended with great difficulty. At all events this must be granted—that in a certain proportion of cases in which there is no doubt at all that the liver is diseased, the physical facts and other features of the case are difficult of interpretation, and that at least a large proportion of the above-mentioned diseases of the liver have at one time or the other been mistaken for cancer, or *vice versa*, by observers of no mean experience and competence. And probably every physician who has had much practical acquaintance with cases of hepatic disease has reason to recall such precedents for his own consolation.

The exact statement of Frerichs⁸ on the condition of the spleen in hepatic cancer is that "it is very rarely enlarged; of the ninety-one cases subjected to analysis there was enlargement of the spleen in only twelve; in all the other cases the organ was either of normal size or small." This statement has often been

¹ "Diseases of the Liver," Third edition.

² "Diseases of the Liver," *New Syd. Soc. Translation*.

³ "Diseases of the Liver," Third edition.

⁴ *Med. Press. Circ.*, London, Oct. 15, 1884.

⁵ "Diseases of the Liver and Gall Bladder."

⁶ "Diseases of the Gall Bladder."

⁷ *Brit. Med. Journ.*, London, 1895, vol. i. p. 253.

⁸ *Op. cit.*

quoted, sometimes in its entirety, sometimes in its first clause only; whilst some writers state that the spleen is never enlarged in cancer of the liver, and others make no reference to the subject. Waring in his recent work says enlargement of the spleen is absent in all "uncomplicated cases" of cancer of the liver. In the instances of the disease related by Murchison only one (case 1) presented a splenic tumour, and in this the lower end of the spleen was felt projecting for $1\frac{1}{2}$ in. below the ribs. Post-mortem examination showed the spleen to weigh $17\frac{1}{2}$ oz., and to contain several masses of cancer. In this case the right kidney, as well as the liver and spleen, was affected, but clinically the case was one of cancer of the liver; for, in addition to hepatic and splenic enlargement, the symptoms were jaundice, ascites, and abdominal discomfort, there being an entire absence of renal disturbance, and the urine being free from albumin, though the right kidney was "simply a mass of disintegrating cancer." Jenner,¹ after stating that "cancer of the spleen is exceedingly rare," quotes a case in which, following scirrhus of the breast, the liver became large and hard, and there was present in the left hypochondrium a large tumour, "plainly the spleen."

It may then be accepted that enlargement of the spleen in cases of cancer of the liver is quite an unusual occurrence. There are, however, occasional exceptions to the rule; and further, there are at least two other possible events either of which may readily be mistaken for enlargement of the spleen, and may thus, when associated with cancer of the liver, assist in producing an erroneous conclusion. The first of these is the simulation of a splenic tumour by an enlargement of the left lobe of the liver; and the second, the development of a cancerous mass contiguous to, though not involving the spleen.

A case illustrating the former of these statements was that of a man the subject of an intrathoracic tumour, probably non-aneurysmal. In the left hypochondrium was a firm mass which extended downwards and forwards from below the ribs, was freely movable on bimanual palpation, and responded conspicuously to the movements of the diaphragm. It was dull to percussion, and the dulness was continuous with the ordinary area of splenic percussion, and above and to the right merged into the hepatic dulness. This tumour certainly appeared to be an enlarged spleen, yet post-mortem examination showed it to be the left lobe of the liver greatly enlarged by the formation in it of numerous malignant masses which were doubtless secondary to the thoracic tumour; the right lobe of the liver was strictly normal. Of course in this case no confusion in the essential diagnosis resulted, but the incident illustrates how malignant disease in the liver may be distributed so as to produce a tumour having clinically the characters of an enlarged spleen. And considering the

¹ "On Abdominal Tumours."

important part which the condition of the spleen not infrequently plays in the diagnosis of disease of the liver, the clinical importance of such an occurrence is considerable. The conjunction of events just suggested actually occurred in one (case 3) of Murchison's cases, where during life "the liver and spleen appeared to be considerably enlarged," yet at the autopsy it was found that the apparent enlargement of the spleen was due to "the left lobe of the liver reaching far down and to the left," both lobes being greatly enlarged and infiltrated with soft cancer. Frerichs, too, records a case of malignant disease of the liver in which the left lobe was so much enlarged "that the false ribs in the left hypochondrium appeared pressed out." And Bright,¹ among his various experiences of abdominal tumours, describes a case in which "in the left hypochondrium just below the margin of the false ribs there was a tumour the size of a large fist . . . that could scarcely be referred to any other organ but the left lobe of the liver, the spleen, or the stomach." It proved to be a malignant tumour confined entirely to the left lobe of the liver; and in his commentary on the case Dr. Bright remarks that "the immunity of the right lobe of the liver tended greatly to obscure the diagnosis." Jenner also draws attention to the ease with which an enlarged left lobe may be mistaken for a splenic tumour, but remarks that "whenever the left lobe of the liver is enlarged sufficiently to cause difficulty in diagnosis, the right lobe is also enlarged." This statement in one respect comes into conflict with some of the above recorded experiences, but it supports the suggestion that a tumour in the left hypochondrium simulating an enlarged spleen may be an enlarged left lobe of the liver, and that this possibility must be considered before placing the fact of the quasi-enlarged spleen against a diagnosis of cancer of the liver.

A second possibility to be borne in mind in connection with the existence of a tumour in the left hypochondrium as bearing on the diagnosis of cancer of the liver, is the development of a malignant growth in proximity to the spleen. This event was illustrated by a case in which the detailed diagnosis was a matter of considerable difficulty. It is sufficient here to say, that whilst there were ambiguous signs in the right chest, there was little doubt that the disease had commenced below the diaphragm, and that the liver was gravely at fault. On the whole, the discussion seemed to be between abscess and cancer. As against the latter, it was noted that "in the left hypochondrium is a tumour which is regarded with considerable confidence as an enlarged spleen. In size and shape it corresponds to a moderate splenic enlargement; it is influenced by the movement of the diaphragm, is freely movable on bimanual palpation, and is dull to percussion." Yet post-mortem examination showed the spleen to be strictly normal in size, and the tumour above described to be a malignant

¹ *Op. cit.*

growth (cylinder-celled epithelioma) associated with a cancerous ulcer of the stomach. The ulcer was situated 5 in. from the pylorus and close to the great curvature; it had perforated all the layers of the stomach wall, and the perforation led not into the peritoneal cavity, but into a number of small cavities, containing a creamy fluid, within a tumour mass which passed upwards and to the left and became adherent to the concave surface and lower end of the spleen. There were numerous cancerous tumours in the liver, and the spleen was of normal size. The case is a very complete demonstration of the possibility of a malignant growth being situated so as to suggest an enlarged spleen, and in an obscure case of hepatic disease to so far establish a presumption against a diagnosis of cancer of the liver.

Among the cases of hepatic cancer recorded by Frerichs there are two which may be quoted in connection with the above observation. In the first it was noted during life that "on percussion the stomach appears to be small and the dulness in the left hypochondrium is considerably increased." At the autopsy it was found that "the spleen is connected anteriorly and inferiorly to the ribs by a hard, dense, cancerous tumour, which is opposed to the concave surface of the organ over half its extent; at one place the tumour passes into the parenchyma of the spleen, but everywhere else it can be separated." The spleen was not enlarged. In the second case no clinical suspicion of splenic enlargement existed, but there was a tumour in the left epigastrium and hypochondrium which was proved to be a malignant growth the size of a child's head, and which, as in the case above related, contained a cavity which communicated through an ulcerated opening with the interior of the stomach.

The three cases taken together illustrate some of the difficulties liable to be encountered in the physical diagnosis of hepatic disease. They show, what indeed is a not infrequent experience, that in secondary cancer of the liver there may be little or nothing to direct attention to the existence of a primary tumour even when this exists in, and has ulcerated through, the walls of the stomach; and also that a malignant growth developing directly from the gastric lesion may present itself with such characters as to suggest in the strongest possible manner the presence of an enlarged spleen. And this last fact may tend to confuse the diagnosis, in view of the generally received doctrine that splenic enlargement is not to be expected with cancer of the liver.

One other case may here be recorded as illustrative of the circumstances under which enlargement of the spleen may be simulated. The patient was a woman of middle age who for some months had been losing flesh and strength. There was possibly some extension of the normal hepatic limits but no distinctive physical evidence of malignant disease in the liver. But in the left hypochondrium was a considerable tumour, which, as far as its

physical facts went, appeared to be an enlarged spleen. It was, however, a large malignant mass growing from the cardiac end of the stomach, and there was no evidence of malignant disease in either the liver or the spleen. The case may reasonably be quoted as a demonstration of the completeness with which a malignant tumour of the stomach may simulate an enlargement of the spleen.

A further personal experience bearing on the present question was that of a patient in whom there were physical evidences of hepatic enlargement with, in the left hypochondrium, considerable dull percussion and a sense of undue resistance but without any definite tumour. The case proved to be one of multiple hepatic abscess, and the physical signs in the left hypochondrium were found to depend upon a condition of peritoneal thickening with adhesions in the neighbourhood of the splenic flexure, the result of old standing dysenteric ulceration of the colon.

The statement that enlargement of the spleen is not to be expected with cancer of the liver may then be accepted as undoubtedly the rule, but it is necessary to remember that occasionally cancerous tumours may be present in the spleen as well as in the liver; that malignant disease in the left lobe of the liver may counterfeit a splenic enlargement; and that similar appearances may be presented by a cancerous growth either in the wall of the stomach or originating in connection with a malignant ulcer which has penetrated the gastric wall. All these possibilities must be taken into consideration before the existence of a tumour in the left hypochondrium can be pressed in opposition to a suggested diagnosis of cancer of the liver.

CLINICAL RECORDS.

A CASE OF ACUTE TUBERCULOSIS; APPARENT ARREST AFTER ELEVEN MONTHS' SANATORIUM TREATMENT; ACUTE RELAPSE AND DEATH IN THREE WEEKS.

By NOEL DEAN BARDSWELL, M.D., M.R.C.P.Ed. and Lond.,
Resident Medical Officer, Deeside Sanatorium, Banchory.

CASE.—The patient, A. D., æt. 16 (employed in an engineering shop), was admitted to the Infirmary on January 13, 1899. He gave a history of an ischio-rectal abscess eighteen months previously, followed by onset of cough and expectoration, and during the last twelve months prior to admission, he had gradually developed the typical symptoms and condition of acute tuberculosis, *e.g.* fever, night sweats, and emaciation, etc. Latterly, he had suffered considerably from attacks of diarrhœa and vomiting. On admission, he appeared to be in a hopeless condition, being extremely collapsed, this no doubt largely owing to the diarrhœa,

which was at that time very severe; in fact, he was too ill to allow of any routine examination being made. After six weeks' treatment the diarrhoea had ceased, and he was carried out into the hospital grounds daily. His report at that time was as follows:—Extensive active disease of both lobes of left lung with infiltration of the apex of the right upper lobe. Appetite fair, digestion poor, no diarrhoea, considerably less fever than on admission; weight, 4 st. 13 lb. During the next six weeks he continued to improve, and gained $3\frac{1}{2}$ lb. in weight. He then had a severe relapse, vomiting and diarrhoea returned, and he soon lost all the weight gained. However, he again rallied, and early in May, after a month in the wards, he recommenced his open-air life in the grounds. Examination of his lungs at that date showed extension of previously existing foci of disease, and infiltration of the apex of the right lower lobe (unaffected at first examination). He had no diarrhoea, and his weight was 4 st. $13\frac{1}{2}$ lb. All through the summer he made slow but steady improvement, and with careful dieting his tendency to diarrhoea gradually disappeared; but he gained weight very slowly, only 7 lb. in the fifteen weeks from May to August. During the spell of very hot weather at the end of this last month, he, like many of the other open-air patients, lost some weight, and September 1 found him only 5 st. 1 lb. Examination of his chest then showed great improvement, the disease in the upper lobes of both lungs being considerably arrested, with no sign of disease in the lower lobe of the right lung; there was considerable excavation, however, in the left lower lobe. During the next three months he improved remarkably in every respect, and by the third week in November weighed 6 st. $\frac{3}{4}$ lb., a gain of $13\frac{3}{4}$ lb. in the twelve weeks. He had no fever, except an occasional rise at odd times, was walking two miles or more daily, his appetite and digestion were improved, but his diet was still being carefully supervised. There had been no diarrhoea for months, though for a long period indican had been nearly constantly present in his urine in considerable amount. The left side of his chest was very markedly retracted, and practically immobile, the heart being considerably displaced. Breath sounds were almost inaudible over the greater part of the left lung, and moist sounds were limited to the area of excavation in the lower lobe, and there only audible after cough. In the right lung, physical signs were those of an arrested lesion with compensatory emphysema. Sputum averaged from 1 drm. to 2 drms., and bacilli were still to be found, as a rule, after careful search. In this condition, on November 26, he left for a convalescent home. There he lived the life of an ordinary convalescent. He spent all the day out of doors—walking about as he liked, and slept in a room the windows of which were all closed at night. His diet consisted of—breakfast, at 8.30 o'clock, of tea, bread, and butter; dinner, at 12 o'clock, of meat, potatoes, and milk-pudding; tea, at 4 o'clock, of tea and bread and butter; supper, at 8 o'clock, of $\frac{1}{2}$ pint of boiled milk and bread. During the second week of his stay, the diarrhoea recommenced, and this was soon followed by anorexia and vomiting and relapse generally. Unfortunately, no observations were made as to his temperature, weight, etc. At the end of three weeks he returned to his own home—a poor one in the slums—having lost $7\frac{1}{2}$ lb. Three weeks later, he was readmitted to the Sanatorium wards in an extremely collapsed condition,

suffering from profuse typhoid, typhoid-like diarrhœa, and constant vomiting. Temperature was oscillating between 99° and 101°. He developed the appearance of miliary infection, the larynx became involved, and he died on January 25, rather more than twelve months after the date of his first admission.

POST-MORTEM.—*Left lung.*—Weight, 14½ oz. ; extensive pleural and pleuro-pericardial adhesions. Upper lobe, very much retracted, firm, cutting like fibrous tissue, black and dense on section, enclosing a small dry cavity with dense walls at the apex. Lower lobe, extensive fibrosis all through ; upper portion, enclosing a cavity the size of a walnut, thick-walled, and nearly dry, and several areas of caseous material about the size of a sixpence, enclosed in fibrous tissue. The rest of the lung was almost solid with recent tubercle infection (broncho-pneumonic and miliary).

Right lung.—Weight, 14 oz. ; apex of upper lobe, firm, and nodular, enclosing a small cavity containing a firm mass of caseous material. Several other small encapsuled caseous areas scattered through lobe. Lower lobe, much fibrous new formation at apex ; extensive recent disease through rest of lobe.

Larynx.—Extensive ulceration.

Liver.—Weight, 42 oz. ; showed fatty and waxy degeneration.

Intestines.—Very extensive ulceration, many ulcers of obviously recent origin, others apparently healed, or in process of repair.

REMARKS.—This patient's history is of interest, on account of the gravity of his condition when first admitted, the length of time (some five months) which elapsed before any permanent improvement took place, the very rapid progress he made during the last three months of his stay in the Infirmary, and the even more rapid relapse which followed his removal from the Sanatorium life. The post-mortem gave proof of the great amount of arrest and repair which had taken place in the lungs, and was of interest as showing how much tuberculous material may be lying quiescent imbedded in fibrous tissue, and give little or no indication of its presence. In cases in progress of arrest, "life," as Kingston Fowler says¹ "may depend on the integrity of a fibrous capsule, surrounding a caseous mass ; a condition replete with possibility of evil in the future." It seems probable that the after-history of this case was an example of the possible evil, and though naturally a very guarded prognosis had been given on his leaving the Infirmary, one had not anticipated such a rapid and unfortunate termination.

For kind permission to publish this report, I am indebted to Dr. Porter of Sheffield, under whose care the patient was during his stay in the Sanatorium wards of the Sheffield Infirmary, and for assistance in keeping a record of the case to Mr. Chapman.

¹ "Diseases of the Lungs," p. 409.

REVIEWS OF BRITISH AND FOREIGN LITERATURE.

A Treatise on Mental Diseases. By HENRY J. BERKLEY, M.D., Professor of Psychiatry, Johns Hopkins University. New York: D. Appleton & Co. 1901.

IN the preface to this work Dr. Berkley states that "the absence from English medical literature of a comprehensive practical work on mental diseases—one adapted to the needs of the busy practitioner as well as to those of the student of psychiatry—has led the writer to prepare this treatise." In face of the existence of such well-known works on mental disease as those of Savage, Clouston, Bevan Lewis, and Macpherson, not to mention several others, this statement is certainly difficult to justify. That it is not the result of ignorance is plain from the fact that Dr. Berkley repeatedly refers to some of these books in the pages of his own work, and in many ways shows himself well read in the literature of his subject. Possibly he may think these and other treatises are either not comprehensive or not practical, or both, but if so it is to be feared that his judgment in this matter will not be readily accepted. After all, he might have spared himself such questionable comparisons, as his work is quite able to stand on its own merits, and to come through the ordeal of criticism with credit. The author is already favourably known for his work on the histology and experimental pathology of the brain, and his reputation as a careful observer and accurate thinker will, on the whole, be enhanced by the book under notice.

This is divided into three parts—the first dealing with the anatomy and histology of the central nervous system, the second with the general pathology, and the third with the clinical forms of mental diseases.

As regards the first, it is clearly and concisely written, and is in most respects quite up to date. In the limited space devoted to this part (50 pp.) it is not to be expected that minute details can be given upon all points. A comprehensive summary, with some greater detail in special directions, is all that is looked for, and this he has given. It is noted that he describes the pia arachnoid as consisting of two distinct membranes, with the subarachnoid space between them, and that beneath the pia there is the so-called epicerebral space. Recent investigation inclines to regard the former as a single membrane, and the latter as an entirely artificial product. The latter statement also applies to his illustration of the pericellular sac. The more carefully the brain tissue is hardened, the more difficult is it to make out this structure, and it conveys an erroneous impression of its size and appearance in good sections to depict it as he has done. There is probably no real sac

at all, the nerve cell lying in a space which in health it practically fills completely, only leaving means for lymph percolation round it. In his description of the nerve cells of the cortex he distinguishes four layers only, thus inclining towards the results obtained by the Golgi process rather than towards what true staining reagents show. It will always be a fatal objection to the Golgi process that it does not reveal all the cells present, but is, for some unknown reason, selective; consequently, any conclusions relating to the classification of these cells is liable to imperfection. But the Golgi process has rendered invaluable service in other directions, and these the author describes carefully. He does not favour the view that nerve cell processes are in actual contact with each other, but only in contiguity. The results of Flechsig's researches into the various tracts of cerebral fibres are carefully stated. A very good description is also given of the finer structure of the nerve cell. As this is a subject in which the author has himself done valuable work, his account can be fully relied on. He inclines to attribute more importance, as a test of normal functioning action, to the condition of the nucleus than to that of the cell protoplasm.

In Part II., attention is directed to the pathological conditions found in insanity. Some parts of this are much more fully treated than others, *e.g.* the nerve cells and the blood vessels, while others receive only summary notice. In view of the fact that we have now a reliable text-book by W. F. Robertson, dealing with the whole of this subject, this is perhaps as well. No notice, however, is taken of the morbid condition of the nerve cell, which Bevan Lewis has designated developmental arrest, the importance of which, in cases of idiocy, both he and Hammarberg have insisted upon. This omission is serious, as it now appears to be one of the most important recent contributions to a definite elucidation of the pathological anatomy of certain cases of insanity, and to mark a decided step towards placing these cases on a distinct pathological basis. In view of the author's pathological leanings, this omission is all the more to be wondered at.

Part III., which constitutes fully five-sixths of the book, is devoted to the clinical aspects of insanity. At the outset, the question of classification is faced, but is not answered even to the author's own satisfaction. He confesses that "with our present knowledge of the etiology and pathology of mental diseases, an accurate classification of the multitudinous forms of insanity is an impossibility." There are three bases possible—the clinical, the etiological, and the pathological. The last is the only satisfactory one; but as that is as yet very imperfect, one of the others must in the circumstances be adopted. The author selects the etiological as the main factor in his classification, following for the most part that proposed by Krafft Ebing. Further subdivision is based on the clinical factors.

He divides mental diseases into four groups, as follows:—Group 1. Mental diseases without ascertainable pathological alteration of the brain substance. Group 2. Mental diseases sequential to ascertainable alteration of the cerebral substance. Group 3. Insanities due to inherited or acquired mental instability. Group 4. States of complete or incomplete retardation of the psychical (and physical) development.

Before considering each of these in detail, chapters are devoted to

the general etiology of insanity, to general symptomatology, and to general treatment. This clears the ground and saves unnecessary repetition.

Group 1 is stated to be synonymous with the idiopathic insanities of other authors. It is defined as "an acquired form of mental disease, arising in individuals without an acquired or inherited predisposition" (p. 99). This is a very different definition of the idiopathic group to that given by some authors, *e.g.* Macpherson, who defines such mental affections as neuroses of mind, the majority of which are periodic, arising as a general rule without any apparent cause. Thus the same term is used in widely different senses, and each writer seems to have his own idea of its meaning. It would therefore be advisable to discard the use of it altogether. Dr. Berkley is not even consistent in his own use of it. By the definition given above, heredity is excluded, while later on in the book, in discussing the varieties of idiopathic insanity, he repeatedly draws attention to the influence exercised by this factor in its production. Thus, on p. 152, it is stated that "inheritance plays the same part as in other mental diseases, a defect being traceable in at least 60 to 70 per cent. of all cases." It is thus evident that he does not adhere strictly to the classification originally sketched out. The varieties he describes as belonging to this group are—melancholia, mania, stupor, and states of mental enfeeblement consecutive to these.

The second group, insanities consecutive to organic cerebral lesions, includes general paralysis, syphilitic insanity, senile insanities, and organic dementia. It has besides three sub-groups—(a) intoxication insanities; (b) insanities following bacterial and toxalbumic poisoning; and (c) insanities following autogenic poisoning. (a) includes acute and chronic alcoholic insanity, as well as opium, cocaine, and other forms of chemical intoxication. (b) comprises the insanities of gestation, the puerperium, and lactation, acute delirious mania, and febrile and post-febrile delirium. There seem strong grounds for believing that puerperal insanity is due to a special form of toxalbumic poisoning; but the evidence that those of gestation and lactation are dependent on a similar cause cannot be said to be as yet satisfactory. Group (c) includes the forms of insanity associated with myxœdema, diabetes, uræmia, and analogous conditions.

In Group 3 are placed the insanities of the degenerate. The chief form is chronic progressive paranoia, which, like most other recent writers on the subject, he regards as a well-defined and distinct disease. Under this head there appear the periodic insanities, recurrent mania, and melancholia and *folie circulaire*, as well as some cases of periodic alcoholic insanity. This class also contains a sub-group of psychoses, accompanying or following constitutional neuroses, such as epilepsy, neurasthenia, and hysteria. The chapter devoted to neurasthenic psychoses is specially detailed. Apparently this form of disease is commoner in America than with us. This the author considers to be due to the greater accentuation of the struggle for existence in the States. Obsessions of various kinds are stated to be specially characteristic of this psychosis, and are not elsewhere mentioned. This is not, we think, an accurate representation of their occurrence. Some of the most typical obsessions may be met with in climacteric melancholics and

mild dementes, in whom there is no special element of a neurasthenic character.

The fourth group contains all the varieties of congenital mental enfeeblement. A useful addendum to this chapter is devoted to a description of cranial measurements and stigmata of degeneration.

The last section of the book is devoted to the psychoses of childhood, and to those peculiar to tropical countries.

The clinical part of the book is well written. The descriptions of various diseases are clear, fresh, and concise. Throughout the work, at the end of each section, there is a bibliography of authorities. This is, on the whole, tolerably complete, though it does not always include some important references which one would expect to find. The illustrations are good and fairly numerous, and they are all original. There are also very few printing errors.

JAMES MIDDLEMASS.

Diseases of the Throat, Nose, and Ear: A Clinical Manual for Students and Practitioners. By P. M'BRIDE, M.D., F.R.C.P. Ed. Third Edition. Edinburgh and London: Young J. Pentland. 1900.

THE third edition of Dr. M'Bride's Clinical Manual will be gladly received by the profession. As before, it appears as a portly but not cumbrous volume, containing in its 712 pages a very practical account of the diseases of the parts named in the title. Ninety-one pages are devoted to diseases of the pharynx; 161, 173, and 275 to those of the larynx, nose, and ear respectively.

Among the more recent additions to the descriptions of diseases of the pharynx belong those of "angina ulcerosa benigna" (p. 14), described by Hering, and "acute ulcerating lacunar tonsillitis," simulating primary syphilis, described by Moure. In the second part of the treatise some new methods of examination are fully described, including bronchoscopy and autoscropy. A paragraph has been added (p. 249), on a persistent falsetto or eunuchoid voice, a condition giving rise to very great social distress in those affected by it, who are not infrequently individuals sound and vigorous in all other regards. Among the various diseases of the nose, those affecting the accessory cavities have been the object of considerable study since the former edition of the book was published, and the voluminous writings which have been published with regard to them have been very judiciously weeded by our author. The various methods of inspection, transillumination, and exploratory puncture are approvingly described. Dr. M'Bride avows modification of his former views with regard to the question of operative interference with the frontal sinus, and very judiciously urges the making of an external opening, even if only for exploratory purposes, when there is any considerable probability in favour of the presence of pus. Should the sinus be found to be suppurating, he is in favour of the Ogston-Luc method for most cases, reserving Kuhnt's operation for exceptional instances. The ethmoidal cells and their diseases cannot be other than a *bête noir* to the descriptive writer, although to deal with them is not a matter of any particular difficulty to the experienced rhinologist, whose practised touch and eye can generally indicate to him how far to go.

To describe the rationale and details of his technique on paper is extremely difficult. The author has therefore contented himself for the most part with giving the views of various writers, and interpolating counsels of caution against too great energy in breaking down the partitions in the ethmoidal labyrinth. While admiring his anxiety to avoid unpractical pedantic refinements, we think he might have allowed himself a little more scope in regard to the diagnosis as well as the treatment of chronic suppuration in the sphenoidal sinuses. Naturally, however, operations in this direction must be more or less monopolised by specialists, and Dr. M'Bride may justly feel that it is better, not to encourage others to rush in where the *cognoscenti* very properly tread with fear. In the treatment of diseases of the ear, he continues along the judicious lines which he so successfully followed in his previous editions. Apart from the complications and dangerous sequelæ of suppurative inflammation of the middle ear, there has been little of practical importance calling for amplification; he has, however, added very considerably to his account of the operations on the mastoid process, and has departed so far from his Spartan objection to illustrations, that he has inserted two drawings (albeit not very large ones) to illustrate the subject. It must be admitted that the surgeon who proceeds to operate on the mastoid under the guidance of diagrams alone is a bold and dangerous person, and it is only frequent observations of operations and practice on the mastoid of the cadaver that would justify him in undertaking operations on the living subject, except under circumstances of the greatest urgency.

The section on diseases of the auditory nerve and labyrinth has afforded little scope for revision. The original clinical classification of these diseases has been of great practical use, and this will be found true of whatever has been added, as, for instance, the diagnostic value of inhalation of amyl nitrite (p. 695) taught us by Lermoyez. The student or practitioner who desires to obtain a practically useful insight into the specialties of laryngology, rhinology, and otology, cannot do better than study this work. It is complete, so far as any one volume of reasonable size can be; it is clear and dogmatic, wherever lucidity and dogmatism are, in the nature of things, possible; above all, its teaching is in every respect *safe*.

DUNDAS GRANT.

Notes on Physiology. By HENRY ASHBY, M.D. Seventh Edition.
London: Longmans, Green & Co. 1900.

THIS small book has already passed through six editions, and the present one has, according to the author, been thoroughly revised, and several chapters rewritten. Unfortunately this revision has been by no means thorough, and the book, as it stands at present, is far from being a trustworthy guide in matters physiological. Scant attention has been paid to recent developments in this progressive subject, and the treatment of most of the chapters is not sufficiently thorough to enable a student to acquire that amount of knowledge which is requisite for examination purposes. It is unfortunate that so many inaccurate statements have escaped correction during the revision, and these are especially to be met

with in parts dealing with physiological chemistry. It would serve no good purpose to simply enumerate them, but attention may be called to the curious description of the functions of the liver in nitrogenous metabolism, the sources of urea, the description and classification of proteids, etc. Those parts of the book which deal with the more anatomical side of physiology are more reliable, although even here there are both inaccuracies and omissions—as, for example, referring to the ovum of the bird as mesoblastic (instead of meroblastic), the network of the spleen as cellular, and the hypoglossal as the ninth nerve. As it is mainly for the use of students preparing for examinations, the book should be carefully revised before the appearance of another edition.

T. H. MILROY.

Text-Book of Histology. By Dr. PHILIPP STÖHR. Third American from Eighth German Edition. London: Rebman Ltd. 1901.

THIS excellent text-book has been reviewed already in this Journal, and the new edition, including, as it does, a comparatively large number of new illustrations, may be confidently recommended as a most useful guide to any one studying animal histology. It differs from Böhm and Davidoff's work, in describing almost entirely what the student can make out, and not going much beyond that. It is, as is well known, written and edited by two exceedingly able histologists, who have made it their aim to give a brief but lucid description of the simpler methods of histological technique, and the appearances of the tissues after preparation.

T. H. MILROY.

A Text-Book of Histology. By A. A. BÖHM and M. V. DAVIDOFF. American Edition by G. CARL HUBER. Philadelphia and London: W. B. Saunders & Co. 1900.

THE original of this translation is in the first rank of histology manuals. It is more complete than the text-book of Stöhr and Schaper, the microscopic technique especially being more fully described than in the latter; but otherwise they are alike in accuracy and lucidity. The treatment of the subject is very similar to that adopted in most histology text-books, general histology being, in the first place, taken up, and then the special histology of the different organs. The work of translation has been well performed, and the editor has enhanced the value of the work by many valuable additions, especially in the sections dealing with the motor and sensory nerve-endings, the spinal and sympathetic ganglia, and the innervation of glands and organs. If there be any fault in the book as a whole, and it would be unique were it flawless, it lies in a tendency to a diagrammatic treatment of the illustrations. The technique at the end of each section is, in most cases, admirably described, and will undoubtedly prove of great assistance to those engaged in histological work. Among the many admirable sections, those dealing with bone, bone marrow, blood, and nerve-endings may be specially referred to for their completeness. Altogether this large and handsome work may be heartily recommended to all who desire a modern text-book dealing both with systematic and practical histology.

T. H. MILROY.

A Manual of the Diagnosis and Treatment of the Diseases of the Eye.

By EDWARD JACKSON, A.M., M.D., Emeritus Professor of Diseases of the Eye, Philadelphia Polyclinic. Philadelphia and London: W. B. Saunders & Co. 1900.

THIS book is intended to meet the requirements of the general practitioner and the beginner in ophthalmology, and accordingly deals with the conditions likely to be presented early in practice rather than with the rarer diseases and more difficult operations. That the author has succeeded in this laudable endeavour there is little room for doubt, for it will be difficult to find a work of similar aim and size in which the subject-matter is presented in such a practical, clear, lucid, and altogether attractive manner. The chapters dealing with the anomalies of refraction are particularly well written, as might have been expected, seeing that the author is one of the authorities on refraction in the new world. Throughout, the work is fully illustrated with beautiful diagrams, made from drawings by the author himself, those in black and white dealing with ophthalmoscopic appearances being specially good. The general character of the book reflects great credit on the author, and we have no hesitation in predicting for it an ever-increasing popularity in America, where such a book is needed. In our own country it will be a formidable rival to the excellent handbooks already provided for students and practitioners.

ANGUS M'GILLIVRAY.

A Manual of Syphilis and the Venereal Diseases. By JAMES NEVINS HYDE, M.D., and FRANK HUGH MONTGOMERY, M.D. Second Edition. Philadelphia: W. B. Saunders & Co. 1900.

THE best feature of this book consists in the coloured illustrations. Some of these have been transferred bodily from Mraček's well-known "Atlas," and are excellent; others have been reproduced from English sources (with more or less acknowledgment), and have suffered much in the reproduction. Many figures in the text have been borrowed from different works, and vary much in value—some being quite useless. In all the wide field of syphilitic pathology and morbid anatomy, the writers have not seen fit to illustrate a single point; this is the more unfortunate, as their description hardly does justice to the subject. References are always a trouble to authors, especially if they have to be verified, and their absence may be excused in an elementary book which possesses no claim to completeness or originality. Drs. Hyde and Montgomery practically dispense with all references to the writings of others, almost the only one being to a fanciful view of the cause of organic stricture—the escape of minute quantities of urine into the submucous tissues! This might well have been spared.

The work cannot be regarded as contributing anything new to our knowledge of venereal diseases; indeed, in many sections, it does not represent its present state correctly. Can it be recommended as a students' manual? We do not think that it can, for the following reasons:—

1. It is disfigured by American expressions, and by high-flown and frequently meaningless or absurd passages. For instance, what can the

English reader make of the following terms:—"A jock-strap," "the swimming-trunks," "to jugulate the disease," "the cut-off muscle" (of the urethra). The authors are fond of the word "jugulate," which occurs repeatedly; we are informed that it means to shorten the life of anything (with a delicate reference to homicidal wounds of the throat). A book full of such expressions as "clap-shreds," "syndromes," "bastard gonorrhœa," "resolutive syphiloderms," and the like, is to be avoided by those who do not wish their verbal currency to be debased. The time seems to be approaching when an Anglo-American glossary will be required in medical literature.

2. It contains many statements which are false or misleading. A few instances must suffice:—"The secretion of the syphilitic initial lesion is non-auto-inoculable." This is repeated many times, the well-authenticated exceptions being quite ignored. The reviewer has observed several instances of auto-inoculation of hard chancres, occurring days or weeks after the development of the first one.

"The sole constant characteristics of every chancre are . . . a sclerosis, induration or dense thickening of the base of the lesion," etc. Elsewhere Drs. Hyde and Montgomery use the term primary sclerosis as synonymous with infecting chancre. Nothing could be more inaccurate. Every surgeon with experience knows that syphilitic infection sometimes results from an insignificant papule, a white patch on a mucous surface, or what appears to be a soft sore, and that marked induration may be absent from first to last in each one of these primary lesions.

The word sclerosis has taken its proper place in pathology, especially with regard to diseases of the nervous system. To substitute it for primary chancre is foolish and misleading. The temporary cellular exudation to which induration of a chancre is due, has not the slightest resemblance to the permanent fibrous degeneration to which the name sclerosis is fittingly applied.

"In a majority of cases of gonorrhœa, less uniform results are obtained from the oil of sandal-wood than from copaiba." That gastrointestinal disturbance and skin rashes are very uniform results of copaiba administration, whilst they hardly ever follow the use of sandal-wood oil, is true, but it is not the authors' meaning.

For a specimen of involved and idle writing the following would be hard to beat:—"The most of syphilitic histories may be traced along the lines of advance represented by the four divisions hereinafter described. From the point of infection, each of these lines of advance, or excursions, represents, it should be remembered, not a narrowly bordered pathway of symptoms, but a general direction, with variations deflected on either hand to divergences from other directions—no single history, perhaps, following the same course, but each trending near one or another of the excursions defined." How much easier it would have been to say that few cases of syphilis are exactly alike!

Can the reader picture to himself "a single history not following the same course, but trending near a defined excursion?"

In the treatment of gonorrhœa, "tobacco in all forms should be avoided; smoking is especially bad." There is not the least reason to think that the gonococcus is affected one way or the other by an

occasional pipe indulged in by the patient. Methylene-blue is recommended to be given internally with the balsams in cases of gonorrhœa, and a saturated solution of pyoktanin-blue as an application for chancres. The authors admit that one or both of these measures are apt to draw attention to the patients' condition. Are physicians ever guilty of such absurdities as dosing their cases of gonorrhœa with methylene-blue?

3. There is no reason why a book on syphilis and gonorrhœa should not be written in a scientific manner, and be free from unpleasant discussions of certain sexual topics. Drs. Hyde and Montgomery drag in these topics on every possible occasion, though it would be wrong to say that they do not at times moralise on them in a highly edifying manner.

It has been well said that "want of decency is want of sense"; many passages in this book are unfortunately deficient in both decency and sense. That this statement is not too strong the reader may judge from the following extracts:—

"The monthly flux of a young woman represents the price paid by her for virginity, clean living, and a delay of the performance of the sexual function, *until she is solicited* in marriage by an acceptable suitor" (p. 328). The italics are our own.

"None the less it is certain that the attractiveness of a youth leading a clean life—that which makes the eye of man and woman dwell on his person with a sense of delight, the promise of manhood writ large on his features and figure—is to a degree proportioned to his involuntary losses at night" (p. 329).

"By the touch the physicians should be able to discover . . . an elephantiasis . . . or a *vaginismus*" (p. 23).

Comment on the foregoing extracts is superfluous. But it is desirable that the plainest language should be used with regard to a practice (it cannot be called a measure of treatment) which is recommended by the authors in certain cases of so-called prostatitis or posterior urethritis. We refer to repeated "massage of the prostate," per rectum. That this disgusting and filthy performance has come into a certain vogue amongst specialists in America, and on the Continent, we have unfortunately evidence. But that it should be endorsed by writers of the position of Drs. Hyde and Montgomery is surprising. No self-respecting surgeon will for a moment countenance such a degrading and useless practice.

In conclusion, it must be stated that this book is neither a complete treatise on the subject of venereal diseases, nor even a perfect epitome of general knowledge on the subject, and that it is disfigured by many errors of taste and by a poor and involved style of writing.

J. HUTCHINSON, JR.

Statistical Report of the Health of the Navy, for the year 1899.

London: Eyre & Spottiswoode.

THIS blue book on the health of the navy, published under the auspices of the Secretary to the Admiralty, appears a little late, probably because of its being brought out in a new form. The accounts of diseases as they were observed by men on the spot, which constituted the chief feature of interest in former Reports, are now omitted.

In addition to the usual statistical information on sick-rates and

death-rates, which occupies about one-half of the volume, there are published, in the form of an appendix, a series of nine selected papers contributed by medical officers in the service.

The first of these is an interesting medical history of the Naval Brigade engaged in the siege of Ladysmith. Out of a total of 284 men, thirty-seven, or 13 per cent., died; only $1\frac{1}{2}$ per cent. succumbed to casualties in action, while 10 per cent. died of enteric fever, which attacked no less than 25 per cent. of the force. The author, Surgeon Fowler, R.N., ascribes the enteric to the stream running near the tents of the Naval Brigade, while other authorities deny this, and ascribe the outbreak to the old-standing contamination of the ground. Enteric fever, as usual, attacked the younger men by preference, while dysentery and simple continued fever showed an equal incidence at all ages. The author believes that enteric fever and dysentery would have been more prevalent, if an efficient distilling apparatus had not been improvised by the engineer attached to the force.

There is an interesting paper on frambœsia, or yaws, by Surgeon P. H. Boyden, who had the misfortune to acquire the disease through the prick of a hypodermic needle, while engaged in operating on a patient suffering from yaws. He makes out a strong case for the individuality of yaws, and distinguishes it from syphilis by the following points: it is usually inoculated accidentally, and is very rarely venereal in origin; it may precede, succeed, or run concurrently with primary syphilis; it is auto-inoculable, and mercury and iodides have no specific influence upon it.

There is a good account of the plague at Hong-Kong in 1896, and a paper on beri-beri by Surgeon Dalton.

In some of the papers there is evidence of indulgence or oversight on the part of the editor; for example, when one author reports of a particular micrococcus, that "in no case did the growth cause liquefaction of the agar-agar"; and another, in giving a clinical description of "tobacco heart," declares that "in its slightest form it shows itself by a muffling of the heart sounds, and in its more advanced form by bruits and irregularity."

We trust the Admiralty will further encourage original work and observations on the part of its medical officers, and afford them every possible facility, including terms of leave for study at the larger hospitals and medical schools.

ALEXIS THOMSON.

RECENT ADVANCES IN MEDICAL SCIENCE.

MEDICINE.

UNDER THE CHARGE OF

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ACUTE INTESTINAL OBSTRUCTION NEAR THE JUNCTION OF THE DUODENUM AND JEJUNUM.

IN the course of a very severe attack of enteric fever, a patient of Bäumler (*München. med. Wchnschr.*, April 23, 1901), female, æt. 25, a factory hand, developed acute hæmorrhagic nephritis. Her symptoms gradually subsided from critical to mild under treatment by baths. Shortly afterwards, however, slight congestion of the lungs supervened, with, about the end of the fourth week of the illness, one single discharge of blood from the bowel. Intestinal meteorism was noted. In time the pneumonic symptoms disappeared; the distension of the bowel disappeared; stasis replaced diarrhœa. By the end of the fifth week her morning temperature was normal, rising each evening to 38°·2 C. Appetite had returned, but only liquid foods could be comfortably digested. Thirty days after admission, suddenly, and without warning, intense abdominal pain set in, with retching. Temperature rose to 37°·8 C., pulse to 110. Next morning patient suffered from bouts of excessive pain, and from prolonged attacks of hiccough. Although she had eaten nothing since the evening before save small pieces of ice, she vomited about 125 c.c. of bile-coloured fluid. This gave no reaction for free hydrochloric acid. The abdomen was not much distended, but somewhat resistant, without increased tenderness to pressure. The liver dulness rather small. The stomach could be easily recognised reaching to below the umbilicus, and giving marked splashing sounds upon direct percussion. To the left of the umbilicus, corresponding to the lower border of the stomach, a half-moon shaped dull area was apparent.

The bleeding from the bowel eighteen days before suggested the probability of an intestinal ulcer, reaching to but not perforating the serous coat, being present; the vomiting pointed to ileus. Against the latter were—no marked abdominal distension, and the passage on the 31st day of two watery motions. The constant pains were subdued with morphine and atropine, the vomiting soothed by lavage, and the great thirst with ice and milk *per orem vel rectum*.

Next day bile-stained liquid was occasionally vomited. Her condition otherwise was the same, except that over the gastric area slight peristaltic ripples, moving from left to right, were visible. The advisability of operation was discussed, but negatived owing to the state of the lungs. Two days later, as the amount of fluid removed from the body in the material vomited could not be compensated for per rectum, subcutaneous injections of a physiological salt solution 450 c.c. (16 oz.) and 200 c.c. (7 oz.) were practised. As the patient lost flesh the contour of her large distended stomach became plainer through the abdominal wall.

Thirteen days after the first onset of abdominal symptoms death took place. Post mortem the stomach was found to be enormously dilated, reaching three fingers-breadths below the umbilicus (? 2·5 in.), the transverse colon alone interposing between it and the pubis; duodenum empty, its coils, pressed together, lay almost entirely in the small pelvis; appendix contained several round and firm concretions. The pyloric ring was somewhat enlarged; the duodenum very dilatable; on raising the stomach, its contents filled the duodenum and upper part of jejunum. The duodenum, although displaced downwards, had retained its usual horizontal position. The serous covering of the duodenum over an area of almost 2 c.c., where it had been pressed against the spine by the overloaded stomach and a stretched fold of the jejunal mesentery, was discoloured, and corresponded with a patch 1·5 c.c. in size, of necrosis of the underlying mucous membrane, sharply defined in circular form. Enteric follicular ulcers, most of them cicatrised, were found in the ileum; the serous covering was not affected in any of these.

The case apparently was an example of that somewhat rare condition, acute dilatation of the stomach. An objection to this view is to be found in the fact that the patient, according to her friends, had suffered previously from gastric troubles of unknown cause; and further, that her stomach may have been dilated beforehand without giving rise to symptoms.

Again, the excessive flatulence present, both in the stomach and bowel, during several weeks, may have played some part in producing it; but in such cases dilatation can only occur when the muscular coat is weak, and weak peristalsis can scarcely be visible externally; here the gastric movements were quite perceptible. As after first few days general distension of the abdomen was seen to be absent, the earlier diagnosis of peritonitis gradually was abandoned in favour of some obstruction of the gut, probably in the upper part of the duodenum, arguing from the rapid filling of the stomach with bile-containing fluid.

The condition in reality was as follows:—A large stomach, pushing down the transverse colon against the pelvic bones. The whole small intestine, save part of the duodenum, lying clear in the small pelvis; the lower section of the duodenum, descending with the stomach, being pressed against the spinal column by its weight, the extra stress upon the mesentery at the duodenal-jejunal juncture, owing to the descent of the rest of the small bowel into the pelvis, aiding in this result.

[The presence of gastropptosis and enteropptosis is not mentioned,

except in the final academic summing up, but there was at least pyloroptosis and splanchoptosis in the case.—A. L. G.]

The points of moment are thus classified :—

Conditions favouring such external impaction of the bowel.—(1) Unusual length of the mesentery. (2) Gastropptosis. (3) Enteropptosis, when influencing the position of the duodenum, and acting on the outer attachment of the mesentery. (4) The position of the duodenal-jejunal sections in relation to the spine. (5) Marked lumbar lordosis. (6) Excessive emaciation and debility. (7) Chronic enlargement of the stomach. (8) Prolonged recumbent posture. (9) Too free clearance of the bowel before operations.

Conditions directly leading to such bowel obstruction.—(1) Overfilling the stomach, especially if already atonic or dilated (Fraenkel, Kundrat). (2) Chloroform-narcosis, at the time or afterwards. (3) Operations upon the bile-ducts (Riedel, Kehr, etc.). (4) Laparotomies (v. Herff). (5) Compression of the thorax from a plaster of Paris jacket.

Cases are on record (Schnitzler and Müller) in which the pressure of an overfull dilated stomach, forcing the small bowel into the pelvis, and between it and the opposing resistance of an over-stretched and tense mesentery occasioning obstruction, has been diagnosed, and relieved by gastric lavage and adoption of a decubitus favouring decrease of pressure downwards. Bäumler fears that the condition of the patients suffering from this lesion will be found not to permit of operation, for serious symptoms appear in a moment. [Forgetting that where the patient's condition is grave the possibility of saving life and relieving suffering is better than partial and temporary aid, with the probability of death or the certainty of recurrence if the primary cause has not been removed.—A. L. G.]

Kundrat recommends in all such cases the performance of gastro-enterostomy; Bäumler fears for the lives of the exhausted sufferers. [If a stomach is so much enlarged or displaced as to compress the small bowel against the spine or the pelvis, surely operation is called for at once.—A. L. G.]

ENTEROPTOSIS.

ARNEILL (*Am. Journ. Med. Sc.*, Phila., April 1901), after a historical retrospect, analyses eighty cases of enteropptosis which, with a few exceptions, he has personally examined. Sixty-nine of these were females, eleven males; or about 1.0 per cent. of males treated, 12 per cent. of females over 16. (The author transposes the sex in his table given, so that these proportions may be wrong.) In twenty-four cases both kidneys were displaced, the right generally more than the left. The right alone was dislocated in thirty-three; the left in four; no note of this condition in seven. In eight the tenth ribs were distinctly floating,—Stiller's sign; in seven they had membranous attachments. Sixty-three cases were seen before attention was drawn to this phenomenon.

The stomach in twenty-eight lay entirely below the umbilical level; in forty-one its greater curvature reached from 2 to 3 in. below it, the

lesser curvature being 1 to 2 in. above it. In three cases the stomach was not dislocated; in eight no note of its position. Several cases exhibited gastric dilatation as well as displacement. Of fifty-six of the females, thirty-five had borne children; twenty were childless; one had aborted once.

Ages	10-20	30	40	50	60	70
	1	32	19	20	7	1

In a few of the patients no symptoms save loss of weight, and debility, mental and physical, were exhibited; in the majority, however, nervous symptoms were predominant. Hypochondriacal, melancholic, irritable, hysterical; some of them nervous wrecks. Others, again, in addition to these nervous symptoms, suffered from dyspepsia or severe gastralgic attacks. Almost all were chronically constipated, and constantly experienced migrains. The gastric contents were more frequently subacid than hyperacid; (contrary to most other observers) Arneill regards congenital cases as those most likely to show hyperacidity.

That twenty out of fifty-six of the females had never borne children, and that many had never tight-laced, nor had undergone abdominal operations, nor suffered from wasting disease, points, in the author's opinion, to a frequent congenital predisposition to enteroptosis. Such cases usually possess floating tenth ribs. Chlorosis does not appear to be connected with the condition; tuberculosis may secondarily cause it through the wasting produced.

With regard to treatment, Arneill utters a word of caution as to operations devised for keeping in place a movable kidney, such as nephrorraphy; for this good reason, that displacements of other organs, especially of the stomach and colon, commonly accompany dislocated kidney, but are seldom looked for. The kidney is replaced, but the symptoms, due as much to gastroptosis or enteroptosis as to that lesion, often persist. Many women with uterine displacements or torn perineæ develop as well some degree of enteroptosis, and disappointment ensues after successfully treating the former at the non-disappearance of the distressing nervous symptoms common to both.

Abdominal belts to support the organs constitute almost all the treatment at our command. One case has been operated on, the kidney stitched in position at one operation, the gastro-hepatic omentum and gastro-phrenic ligament shortened at a second, with complete success. Gastric symptoms must be treated as they arise; the general bodily tone improved.

SURGERY.

UNDER THE CHARGE OF

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TREATMENT OF COLITIS BY VALVULAR COLOSTOMY AND IRRIGATION.

The difficulty or impossibility of efficiently irrigating the colon per rectum has led to the adoption of irrigation through an opening in the cæcum.

The drawbacks of an artificial anus are, however, considerable, and the risks entailed in attempts to close the opening, when it is no longer required, have prevented the treatment being adopted in practice. Gibson of New York proposed that the opening in the cæcum should be made of a valvular character, similar to that employed in Witzel's method of performing gastrostomy, so that there would be no escape of fæces and the opening would finally close of itself when it was no longer required. Bolton has carried this out in the following case. A man, æt. 42, was the victim of severe diarrhœa, along with fever and prostration, of eight weeks' duration. The evacuations took place about every hour, and contained blood and mucus. Medicinal and dietetic treatment gave no relief. There was rapid loss of flesh. The mucous membrane of the rectum and sigmoid flexure showed superficial ulceration. No amœbæ were found in the stools.

A small incision was made over the cæcum. In the situation of its anterior band an opening was made just large enough to admit a small rubber catheter. Three tiers of sutures placed above and below this orifice served to invaginate the wall of the cæcum. The ends of those last introduced were carried through the edges of the abdominal wound, fixing the cæcum to the parietes. Irrigation of the colon was commenced at once. The patient was placed on an ordinary douche pan and a large Kelly's urethral speculum was passed through the anus. Several quarts of 0·01 per cent. silver nitrate solution were injected through the catheter, and the colon thoroughly washed out. The silver solution was followed by 0·5 per cent. salt solution. For the first three days this washing was done twice daily; for the next eleven days once daily, and the strength of the silver solution increased to 0·02 per cent.; for the remaining time every other day. After the seventh day the catheter was removed except at the periods of washing, and in the intervals there was absolutely no leakage. Even during the injection, when the cæcum and ascending colon were tightly distended and bulging the abdominal wall, no fluid followed if the catheter was withdrawn. There was never any difficulty in introducing the catheter. The diarrhœa improved from the outset. At the end of two weeks no ulceration of the mucous membrane could be seen. At the time of his discharge he was defecating without pain from one to three times daily, and he had increased ten pounds in weight. Twelve days later the fistula was healed.—*Med. Rec.*, N. Y., March 16, 1901.

SALINE INFUSION IN SEVERE BURNS.

PARASCANDOLO of Naples ascribes the fatal result in severe burns to the absorption of a toxic substance derived from chemical changes in the burnt tissues, and thinks the tendency towards death is best combated by removing the necrosed tissues and infusing saline solution. He records three cases of very severe burns in which the patients, æt. 3, 4, and 17 years respectively, were in a most critical condition, with stupor and suppression of urine, and in which recovery followed as a result of introducing salt solution into the cephalic or basilic vein. The infusion was repeated daily for several days. Where intravenous infusion is not

practicable, the salt solution should be injected into the subcutaneous cellular tissue.—*Centralbl. f. Chir.*, Leipzig, April 27, 1901.

REMOVAL OF TUBERCULOUS MESENTERIC GLANDS.

Two cases of this are reported by Elliot and Richardson respectively. Both were operated upon under a mistaken diagnosis of acute appendicitis. Elliot's patient was a boy, æt. 8, who had an attack of abdominal pain a year before, regarded as colic. The present attack developed suddenly while recovering from influenza, with pain in the belly and fever. There was marked tenderness on the right side of the abdomen and some resistance, but no vomiting. The temperature rose to 104° F. On opening the belly the appendix was found to be healthy; a group of enlarged caseating glands was found in the mesentery of the ileum 3 inches above the cæcum; the glands were removed and the wound packed with gauze. The following day the packing was removed and the wound closed. The boy made a perfect recovery, and was quite well sixteen months later.

In Richardson's patient, a boy æt. 5, the abdominal pain also followed an attack of influenza; there was no movement of the bowels, and the temperature rose to 104°·2 F. A tender swelling could be felt to the right of the umbilicus. When the abdomen was opened the appendix and cæcum were found to be healthy. A number of enlarged caseating glands were removed from the ileo-cæcal mesentery. Complete recovery followed, and five years later the boy was perfectly healthy.—*Tr. Am. Surg. Ass.*, Phila., vol. xviii.

EXCISION OF THE MUCOUS MEMBRANE IN THE TREATMENT OF EXTENSIVE PROLAPSE OF THE RECTUM.

DELORME removes the mucous membrane of the entire prolapsed portion of bowel, whether rectum alone, or colon in addition, and stitches the divided edges together by circular suture, somewhat after the method of Whitehead's operation for piles. After clearing out the bowel, the operation is commenced by dilating the sphincters and dividing the mucous membrane at the anus; the separation of the mucosa is then proceeded with, at first in front, then at the sides, and lastly behind. In one case he removed as much as 80 cms. He claims as advantages of this method that the sphincters are preserved, the peritoneum is not opened, and that the folding up of the prolapsed tissues strengthens the rectum. The operation, however, is a very tedious one, it entails considerable loss of blood, and the after-treatment is severe, almost amounting to starvation, so as to avoid any strain on the sutures.—*Centralbl. f. Chir.*, Leipzig, October 13, 1900.

THE REDUCTION BY MANIPULATION OF CONGENITAL DISLOCATION OF THE HIP.

LORENZ, in a recently published monograph on this subject, records his experience based on over 400 cases. As indicating the frequency of the lesions, his statistics show that it is four times as common as congenital

club foot. It is chiefly met with in female children, and in later years especially it may result in serious impairment of functions of the affected limb.

The chief obstacle to reduction is to be found in the soft parts. The age limit for successful reduction is placed at 10 years for the unilateral, and at 7 or 8 years for the bilateral dislocation. The earliest age at which it should be attempted, corresponds to the period when the child has learned cleanly habits. As regards the method of reduction, when the soft parts are markedly shortened, he recommends preliminary tenotomy and extension in bed; reduction may take place on the upper rim of the acetabulum by simple extension in the extended position, and with the limb rotated inwards; Lorenz prefers, however, that reduction should take place over the posterior rim of the acetabulum, and this may be favoured by placing a padded wedge under the trochanter; in many cases reduction can only be effected by way of the lower margin of the acetabulum, the thigh being flexed to the utmost and abducted as in the method devised by Paci. The retention of the head of the femur within the socket, after reduction, is often difficult. If redisplacement tends to take place backwards, the limb should be maintained in an attitude of extreme abduction and hyper-extension. The limb is then fixed in the required attitude by a case of plaster of Paris (which need not include the knee) for a period of four or five months. The limb is now made to adopt a normal attitude and is again fixed for six months. The after-treatment consists in gymnastic exercises and massage. It is interesting to know that Lorenz has only once met with fracture of the femur during the performance of reduction.—*Centralbl. f. Chir.*, Leipzig, October 20, 1900.

FATAL CASES OF THROMBOSIS AND EMBOLISM IN SURGICAL PRACTICE.

DR. RUTHERFORD of Glasgow reports the following cases:—(1) A young lady, æt. 25, was operated upon for appendicitis on the tenth day of the illness. There was a circumscribed abscess, outside of and behind the cæcum and close to the iliac vessels; from this cavity the appendix was removed as a slough. She was doing well, and on the third day after the operation the packing was changed. She became collapsed, cried for "breath," and died in half an hour. After death there was found in the right ventricle a large thrombus, 5 in. in length, and as thick as the root of the index finger; it appeared to be a cast of the iliac veins, which were empty. (2) A woman, æt. 27, was operated upon for varicose veins. Six in. of the internal saphena were removed in the thigh, and the circular operation was done in the leg. The wounds pursued an aseptic course. On the tenth day, the patient awakened from sleep, complaining of pain in the left side and difficulty in breathing. She then collapsed, the pulse becoming imperceptible; there were several epileptiform seizures. The patient was dead in about two hours from the onset of symptoms. Large thrombi were found in both branches of the pulmonary artery; there was slight and recent thrombosis in the veins of the thigh which had been operated on. (3) A man was admitted to hospital with a compound fracture of the skull and copious bleeding from the right ear. It was resolved to operate

for the arrest of hæmorrhage and to relieve the symptoms of compression. The trephine opening compromised the lateral sinus, and a fracture was found running down just behind the genu. While attempting to clear the sinus, preparatory to plugging or to involution of its wall, the patient died. The sigmoid bend of the sinus was found to be filled with a laminated thrombus, and there were numerous emboli in the branches of the pulmonary arteries. Only twelve hours intervened between the accident and the death of the patient.—*Glasgow Med. Journ.*, February 1901.

GRITTI'S AMPUTATION WITH METALLIC SUTURE OF THE BONES.

SZCZYPORSKI records three cases of Gritti's amputation, in all of which the patient was able to bear his weight on the face of the stump. The patella, denuded of its cartilage, was fixed with a suture of thick silver wire to the sawn section of the femur; the patient walked with the assistance of a Beaufort artificial limb, capable of flexion at the knee, and provided with a flat surface which supported the face of the stump. The limb was skiagraphed at intervals varying from one to three years after the operation; the bones were perfectly united and the silver wire intact. The above method is a little more difficult to carry out than that employed by the abtractor, namely, fixing the patella by means of a steel pin, which is driven in through the centre of the face of the stump, through the patella, and into the sawn end of the femur; the pin is withdrawn after three weeks, by which time the bones are firmly united.—*Gaz. d. hôp.*, Paris, January 10, 1901.

SUBCUTANEOUS RUPTURE OF THE BRACHIAL ARTERY.

It is rare to meet with the subcutaneous rupture of one of the main arteries, occurring apart from fractures and dislocations with displacement of bone. Michel of Nancy records such a case. The patient, a man æt. 32, fell a height of $4\frac{1}{2}$ ft., striking the inner aspect of his right upper arm against the rim of a cask. There was great pain at the time and afterwards; the following day the arm was very deficient in power, the skin of the hand was bluish and cold, so he made up his mind to go to hospital. On examination there was found an area of ecchymosis on the inner aspect of the upper arm; there was no pulsation in the radial or brachial artery. In the situation of the brachial artery, along the inner edge of the biceps, there was a tender hard cord about 2 in. in length; above this level, the brachial artery was beating forcibly. The grasping power of the hand was greatly diminished, and the temperature of the skin was greatly diminished. The diagnosis was made of rupture of the internal and middle coats of the artery, with subsequent obliteration of its lumen. The treatment consisted in the use of warm baths, and, in the intervals, the application of cotton-wool and a splint. After a fortnight, pulsation returned in the radial artery at the wrist, and the hand became warm. He was then able to return to his work.—*Gaz. d. hôp.*, Paris, January 15, 1901.

TREATMENT OF PERFORATION OF THE INTESTINE IN TYPHOID FEVER.

At a recent meeting of the Surgical Society of Paris, several members reported the results obtained in perforated typhoid ulcer.

Legueu recorded two cases. In the first, a boy æt. 10, the symptoms of perforation occurred on the fifteenth day of the fever; the operation was performed ten hours later; a single perforation was found in the ileum, 6 in. above the cæcum, and was closed with a double row of Lembert's sutures. The child died. In the second case, a boy æt. 15 was seized with the symptoms of perforation on the twentieth day of the fever; the operation was performed six hours later. A perforation was found about 10 in. above the ileo-cæcal valve; as the sutures would not hold in the friable edges of the perforation, the latter was closed by means of an omental graft; the patient recovered, with a fæcal fistula, which closed spontaneously three weeks later. This was stated to be the sixteenth successful case recorded up to the present.

Lejars had operated on three cases, all of whom succumbed. Experience had shown that the operation was more likely to be successful when the perforation occurred during the decline of, or convalescence from, the fever—after the third week. The symptoms consisted in the occurrence of sudden and severe pain in the right iliac fossa, followed by tenderness and rigidity of the belly wall; the temperature may rise or fall, the pulse is quickened and the face becomes pinched. The operation should be performed without delay. The chief difficulty arises from the existence of multiple perforations, but this is exceptional.

Rochard had operated in four cases; in two of these the perforations were multiple, and the patients died; in the other two, no perforation was discovered on opening the belly, and both of them recovered.

Routier had operated successfully in one case, but ten days later other ulcers perforated, and the patient died.

Walther referred to a case in which there was no doubt of the existence of a perforation, but the condition of the patient contra-indicated operation. There resulted a localised peritonitis, and the patient recovered, after the abscess had discharged itself by way of the bladder.—*Rev. de chir.*, Paris, February 1901.

OBSTETRICS AND GYNÆCOLOGY.

UNDER THE CHARGE OF

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TWO CASES OF HÆMATOMA OF THE ABDOMINAL WALL
DURING PREGNANCY.

STOECKEL (*Centralbl. f. Gynäk.*, Leipzig, 1901, No. 10) reports two cases of this unusual condition. (1) P., 4 para, normal labours, presented herself at sixth month suffering from persistent cough. During a

severe fit of coughing she complained of sudden pain in the lower right side of abdomen, with the formation of a swelling. On examination there was found, immediately above the symphysis and to the right side, a swelling the size of a foetal head reaching to the umbilicus, elastic, and with a well-defined outline. Distended bladder, fibroma or lipoma being excluded, and the tumour diminishing during the puerperium, the condition was regarded as a hæmatoma of the abdominal wall, and was incised, scraped, and plugged with gauze. Labour had been terminated by turning and extraction. (2) P., 6 para, normal labours, eight days before last labour, after severe coughing, "felt something give way," and complained of pain in the right side, above the umbilicus. A midwife detected a swelling here, which she regarded as the head of a second child, and endeavoured to express it, but, failing to remove the tumour, she sent the patient to hospital. On admission, there was found below the liver, and slightly to the right of the middle line, a tumour the size of a foetal head, evidently connected with the abdominal wall. There were also multiple hæmorrhages on upper and lower extremities. The swelling was incised, scraped, and plugged, when it was found to occupy the sheath of the rectus muscle.

Stoeckel refers to the occurrence of such cases as the result of injuries, etc., but does not know of similar cases coming on during pregnancy with no history of traumatism. He quotes Engel, who writes in his text-book of anatomy "that the loose connective tissue between the rectus and its sheath favours hæmorrhage into it." He believes that the hyperæmic condition of the abdominal wall (as of other parts during pregnancy) had in the above cases favoured rupture of branches of the superior and inferior epigastric arteries.

The cases are further of forensic interest, in so far as they show the possibility of extravasations of blood into the abdominal wall during pregnancy without any direct traumatic cause.

HYDATID CYSTS COMPLICATING LABOUR.

J. FRAUTAS (*Ann. de gynec. et d'obst.*, Paris, December 1900). The patient was married, æt. 23; her first labour, one year later, was spontaneous, but prolonged and difficult. She subsequently had five children born spontaneously, the last being still-born. Two years afterwards she had a living child born with the aid of instruments, and was told that she was suffering from a fibroid tumour of the uterus. Subsequently she had a miscarriage at three months, followed by a rapidly increasing abdominal tumour. She was removed to Pawlik's clinic, when an irregular, elastic, indistinctly fluctuating tumour was found, extending upwards on the left side nearly to the ribs, on the right side to four finger-breadths below the costal margin. A small tumour was felt at the level of the umbilicus, adherent to the large growth. Laparotomy showed a suppurating hydatid cyst of the left broad ligament, with many adhesions, which prevented the removal of the lower of two pockets of which it was composed. This was marsupialised, after excision of the upper portion, and also drained through the vagina. The small tumours in the left cul-de-sac were hard, and presumably degenerated. These, and small, hard, yellowish nodules in the

omentum and parietal peritoneum, were left. Six months later the patient had a six weeks' abortion, and more than two years later entered Pawlik's clinic in labour. Eleven tumours, some as large as a small nut, situated at the pelvic inlet, prevented engagement of the head. Cæsarean section was contra-indicated owing to the death of the fœtus, which was with difficulty removed by the use of the cranioclast. Four years later the patient was found to be suffering from a tumour reaching to the umbilicus, with two others in the pouch of Douglas. She refused operation until fifteen months later, when the main tumour was found to be suppurating, the smaller growth filling nearly the entire pelvis. The operation terminated fatally.

TWO CASES OF HYSTERECTOMY UNDER COCAINE ANÆSTHESIA BY LUMBAR PUNCTURE.

J. RIDDLE GOFFE (*Med. News*, Phila., October 1900) reports two cases of hysterectomy, one vaginal and the other abdominal, performed under cocaine anæsthesia. In both cases profuse sweating came on about fifteen minutes after the operation, followed by nausea and slight vomiting, and later by severe headache, which lasted about ten hours. The first patient received 30 minims of a 2 per cent. solution of cocaine, and was insensible to the prick of a pin in a few minutes. Vaginal hysterectomy was performed, the angiotribe being employed, but no pain was felt. In the second case the patient had a kyphotic pelvis, and some difficulty was experienced in entering the subarachnoid space. One-third of a grain of cocaine was injected, but as analgesia was very imperfect one-third more was injected. The operation lasted forty minutes, and recovery from the effects of the cocaine was so speedy that the final steps of the operation gave occasional twinges of pain.

Dolérís and Malassis (*Presse med.*, Paris, November 28, 1900) have also employed this method of anæsthesia in twenty-five cases. They used a minimum dose of 1 cgrm. of cocaine, and seldom had any disagreeable after effects. H. J. Boldt (*N.Y. Med. Journ.*, November 23) also tried this method of anæsthesia, but although the technique was carried out most carefully he failed to get the desired effect, and commends caution in the use of medullary narcosis.

A CASE OF PERSISTENT SCIATICA TREATED BY CÆLIOTOMY AND SUSPENSION OF THE UTERUS.

J. W. BEAN (*Med. Sentinel*, October 1900) records the case of a woman, æt. 38, and the mother of one child, who for five years had suffered from sciatica, which had gradually increased in severity until, for the last six months, the continuous pain had scarcely permitted a full night's sleep. The pain was aggravated during the week preceding menstruation, and was relieved during the menstrual flow. The pain was increased on lying down, and she slept in a chair with the leg sharply flexed. The uterus was retroflexed and adherent, and inclined towards the right side. The adhesions were too firm to allow of replacement of the uterus, and abdominal section was advised. The uterus was found

to be bound down to the rectum and posterior part of the pelvis. The adhesions were separated, and the uterus brought forward and suspended according to Kelly's method. The patient has since been entirely free from sciatic pain, which was evidently due to dragging on the nerve by the adhesions.

ANGIO-SARCOMA OF THE VAGINA.

E. SCHWARTZ (*Compt. rend. Soc. de obst. de gyn., et de pediat. de Paris*) relates the following rare and interesting case. The patient, æt. 24, menstruated at 16, had what was probably an abortion at 18, and a normal labour at 23. Menstruation was absent for five months during lactation, but returned, and again stopped for two months. One month before the author saw her she had what her medical attendant considered an abortion, followed by continual and profuse hæmorrhage. On examination, she was profoundly anæmic; the vagina was filled with blood-clots, and an arterial jet issued from an ulcerated surface, the size of a five-franc piece, in the right cul-de-sac. There was also a smaller ulcer in the anterior vaginal wall, but the cervix was not involved. Attempts to clamp the bleeding point failed, and tampons alone checked the bleeding, which recurred six days later. Cauterisation and plugging were then employed, but the patient died. Microscopically the growths were found to be angio-sarcomata.

Schwartz has discovered records of five similar cases, in all of which hæmorrhage was the chief symptom, recurrences taking place in all operated upon. He considers that early removal offers the best chance of life; but where the lesion is too extensive, suggests ligation of the hypogastric arteries as a palliative measure.

A CAUSE OF ERROR IN THE DIAGNOSIS OF ECTOPIC GESTATION.

PAUL BAR (*Bull. Soc. d'obstet.*, Paris, 1900, No. 7) directs attention to the fact that not uncommonly at the beginning of pregnancy the uterus undergoes an asymmetrical enlargement, the cornu develops excessively, and becomes softer than the main body of the uterus, and the body of the uterus is found to be somewhat enlarged and fairly hard. To one side the body of the uterus can be distinctly outlined, while on the other side it is less defined, the uterus appearing to be flanked by a tumour having a somewhat softer consistency than that of the body. Between the soft tumour flanking the uterus and the body of the organ a more or less distinct groove can usually be distinguished. In these cases the soft zone corresponding to the inferior segment is absent, and the body of the uterus is of the same consistence from fundus to cervix; when examined at a later date, the uterus has usually assumed its regular form, the body of the uterus having its regular contour and being separated from the cervix by the usual soft zone. The author quotes three illustrative cases, all of which went to full term. Vineberg in 1895 drew attention to the difficulty of differential diagnosis between irregular development of the gravid uterus and ectopic gestation.

In accounting for the causation of this condition, Bar disagrees with Vineberg, who attributes it to an early metritis interfering with the

development of the uterus. He considers the condition due to the attachment of the ovum in one of the uterine cornua not far from the ostium tubæ, and that this point of attachment cannot be rare, judging from the frequency of irregular development of the uterus at the beginning of pregnancy. In his hospital work scarcely a month passes without a case of this kind being observed. The condition is transient, and is usually observed in the course of the second month. He has only noted its persistence to the fourth month in one case. Its presence is not of serious import, but may give rise to errors in diagnosis. The hard body of the uterus may be mistaken for a fibroma, and this condition may explain cases where, after a diagnosis of a para-uterine tumour has been made, and the abdomen opened, an intra-uterine pregnancy has been found. This condition may easily be mistaken for ectopic gestation, especially in the absence of symptoms before rupture. The points of importance in the differential diagnosis of these conditions he sums up as follows:—"The confusion with tubal pregnancy may possibly be eliminated by noticing the position of the round ligament, which in tubal pregnancy is to the inner side of the tumour; in making out that the groove of separation between the uterus and the tubal tumour does not exist, at least as marked, between the mass formed by the pregnant horn and the uterine body; in locating the situation of the tubal tumour, which is generally behind the uterus, whereas the pregnant horn is very elevated and situated on the side of the empty part of the uterine body."

THERAPEUTICS.

UNDER THE CHARGE OF

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TRIONAL POISONING.

HART reports a case of this extremely rare condition. The patient was a wealthy neurasthenic lady, æt. 50, who had formerly taken trional regularly but had then given it up for several months. The recurrence of obstinate insomnia had caused her to resume the drug. She took 15 grs. every other night with occasional intermissions of three or four days. After two months, when she had taken about 450 grs., she suddenly developed symptoms pointing to acute intestinal poisoning. Colic, extreme nausea, and vomiting persisted for several days, necessitating rectal feeding and morphia. There was no fever. Trional was immediately stopped. On the fifth day the heart became intermittent, and the urine, hitherto normal, became dark red in colour, and was found to contain a trace of albumin and a few granular casts. Next day only 12 oz. of an acid, nearly black, urine was passed of sp. gr. 1025, slightly albuminous and loaded with granular casts. There was no sugar or blood. A substance giving the spectrum of hæmatoporphyrin was extracted. The cardiac weakness increased, and in addition dilation

murmurs developed at the aortic and mitral valves. On the tenth day neuritis commenced, with prickling and tingling sensations and loss of knee-jerks. It spread gradually, and involved especially the extensors of the hands and feet, causing drop-wrist and reaction of degeneration. There was slight irregular fever. Extreme hyperæsthesia of the whole body, especially involving the extremities, was noted, and occasionally there was delirium with hallucinations of time and space. The loss of weight was very marked. Recovery was very slow, but was eventually complete, both heart and kidneys becoming normal. At the end of a year the patient was learning to walk. Hart cannot explain how trional affects the nervous system. As regards hæmatoporphyria, some have suggested that it is due to irritation in the kidneys, while others consider it secondary to changes in the nervous system. Hart's case rather supports the latter view, as it only came on some days later than the signs of vagus involvement.—*Am. Journ. Med. Sc.*, Phila., April 1901.

TREATMENT OF INSANITY BY REST IN BED.

WIZEL is strongly in favour of this method. He has tried it thoroughly in a large number of cases during the last six months with very favourable results. He uses two large wards for noisy and quiet cases, and separate isolation rooms. There is no restraint, but the patients are kept continuously under observation. It is difficult at first to classify the cases. In many cases a noisy patient put among quiet cases became quiet in a short time. In other cases his influence excites the other patients. If he cannot be kept in a ward he is put into a separate room, but still the bed treatment is persisted in. The patient is given a separate attendant. Wizel holds that even for noisy patients this is much more satisfactory than isolation in a cell without observation. He does not find any difficulty in keeping his patients in bed. The avoidance of external sources of irritation is itself conducive to quietness, as is well recognised in the Weir Mitchell treatment for neurasthenia. Quarrelling and fighting are diminished, and the patients are less likely to do themselves and others harm. They are much more easily watched, and hence bad habits can be more effectually prevented. By keeping the hands outside the bedclothes it is possible to diminish masturbation. Since he has introduced this plan the whole aspect of his asylum has changed. It is much more peaceable and more like an ordinary hospital. Its sedative influence is shown by the great diminution in the bill for sedatives. Some Russian writers have objected to this treatment on the ground that it leads to constipation, loss of weight, facilitates masturbation, and makes it difficult to get the patients to resume ordinary life. Many of Wizel's patients gained in weight, while in the other cases the loss was probably part of the disease. Constipation was not increased, while patients rise for their meals and to go to the closet.—*Ann. med. psych.*, Paris, 1901, Nos. 1 and 2.

INTRAVENOUS INJECTIONS OF SODIUM CINNAMATE IN TUBERCLE.

THIS treatment was introduced by Landerer on the ground that the avascular condition of the tubercles render them insusceptible to most

substances circulating in the blood. Cinnamic acid causes a local aseptic reaction round the tubercles, surrounding them with a wall of leucocytes and cells formed from proliferation of the connective tissues. The leucocytes pass into the tubercle, and by the development of spindle cells and capillary blood vessels the tubercle is honeycombed, the necrotic tissue is absorbed, and eventually the tubercle is replaced by a cicatrix. Landerer claims that this drug has a powerful influence on the disease, and he records 88 per cent. of cures out of 157 cases.

Pollak (*Wien. klin. Wchnschr.*, 1900, No. 9), following Landerer's directions strictly, has treated fifty-one patients with uncomplicated phthisis, eight with laryngeal complications, and five with intestinal. Most of the patients were undergoing sanatorium treatment simultaneously. In the intestinal cases the results were negative. In the laryngeal cases the results were more favourable. In several cases which had already been thoroughly treated with lactic acid and iodoform inhalations, rapid improvement followed, leading in these cases to cures. Still, in four cases it had no effect. The uncomplicated cases represented all stages of the disease. In 12 per cent. apparently a complete cure was obtained, while in all 87 per cent. were appreciably improved. The sanatorium treatment alone gives somewhat similar results, so that Pollak concludes that though in certain cases cinnamic acid is of considerable value, in most cases as good results are obtained from sanatorium treatment alone. In some cases the injection had a direct antipyretic action, in others it caused easier spit, while in others a bracing tonic effect was noted, stimulating the appetite and energy. In the same number Hödlmoser reports eighteen cases which he had treated, seven of them as dispensary cases, while the others were in-patients of the hospital. In four cases there was distinct improvement. Kuhn, writing in the *München. med. Wchnschr.*, 1901, has an even less favourable report to make. His patients were eleven unselected cases from the Rostock clinic. His results are by no means striking. In only one case was a definite improvement obtained. Most of the cases were, however, pretty well advanced. All the writers agree that the injections are easily carried out and that they cause no local reaction. Only Kuhn notes that in one case there were symptoms of intoxication. The patient should receive a gradually increasing dose every second day. He should lie down for an hour or two after the injection, but can otherwise attend to his work. None of the writers noted increased tendency to hæmoptysis during the treatment.

MECHANICAL TREATMENT OF ANASARCA.

DEHIO discusses the various forms of mechanical treatment, and describes a special apparatus employed by himself. It consists essentially of a rubber funnel 8 cm. in diameter which is fixed to a rubber band. The skin is carefully sterilised and disinfected, and then several incisions are made close to each other, and the incised area is covered by a funnel which is fixed to the part by the rubber band. In this way it is claimed that the danger of infecting the incisions is prevented. It is not necessary to apply the funnel very tightly as long as air is prevented from passing under it. Too tight pressure prevents the flow of serum.

Provided the limb be kept low, enormous quantities of fluid can be drawn off in this way. The amount of albumin varies in the anasarca of cardiac and renal cases, cardiac cases being always above 2 per mille, while in nephritic cases it never rises above 1·5 per mille, and usually was merely a trace. This agrees with the results obtained by other observers, who state that in general the amount of albumin in effusions due to cardiac cases is greater than that due to renal cases. Several cases are described in which the incision treatment proved very satisfactory, especially the case of a young man who developed general anasarca, following malarial disease which resisted all medical treatment. By means of two incisions in the legs, 7415 cc. were drawn off in seventy-two hours. The wounds were then sewn up and healed by first intention. The patient was then kept going for eleven days by packs, when incisions were again required, which were kept open for nineteen days, during which time 30 litres of fluid was drained off. The wounds were then covered with pale granulation tissue and healed in a few days. In addition, the abdomen was twice tapped. In all 44 litres of fluid was removed in five weeks. The patient left the hospital with chronic nephritis without œdema.—*St. Petersb. med. Wchnschr.*, 1900, No. 51, and 1901, No. 7.

MEDICAL JURISPRUDENCE.

UNDER THE CHARGE OF

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THE DIFFERENTIATION OF HUMAN FROM ANIMAL BLOOD.

THE distinction between human blood stains and those produced by the blood of animals, more especially domestic animals, is a matter of great importance to the medical jurist. When the blood is fresh, measurement of the corpuscles may decide the question, but in the case of dry or old stains it is impossible to make the distinction.

Wassermann and Schütze (*Berl. klin. Wchnschr.*, 1901, No. 7) report a method of differentiation which they have devised, and which, whatever practical value may ultimately be assigned to it, is of considerable interest and promise. The method is based upon the investigations of Bordet and others in regard to *agglutinine* and *hæmolysine*. Bordet showed that if red blood corpuscles of one species of animal be injected subcutaneously into another species, certain substances are formed in the serum of the latter which cause agglutination (*agglutinine*), and also which dissolve (*hæmolysine*) the red corpuscles in the blood of an animal of the former species. These substances thus formed have been shown to be specific in their action, *i.e.* they will only produce a result upon the blood of an animal similar to that used for injection. Thus, for example, the serum from a rabbit injected with guinea-pig blood shows the formation of *agglutinine* and *hæmolysine* only with guinea-pig's

blood, and not when added to that of other animals. It has also been shown by Bordet and others, that not only does this specific action hold good in the case of blood injections, but that also with other animal fluids new reaction products are formed in the blood of animals into which they are injected. Thus if cow's milk be injected into a rabbit, the serum of this animal on being mixed with cow's milk causes precipitation of casein (lacto-serum). It has been further shown that if blood serum from one kind of animal A be injected into another kind of animal B, substances are formed in the serum of B which cause a precipitation of albumin (globulins) in the blood of animals similar to A. On injecting other forms of albumin, peptone, serum globulin, egg albumin, into animals, substances were found to be produced in their serum which exerted a specific effect only upon albuminous substances of a similar nature to those used for injection. Wassermann and Schütze confirmed these observations by experiment, and proceeded to try and evolve a method, based upon them, for differentiating human from animal blood.

They attempted this first of all by means of the action of agglutinine and hæmolysine. Defibrinated human blood was injected into a rabbit, and its serum then applied as the reagent. The specific action was obtained when the blood tested was fresh, but the method was inapplicable in the case of old blood, because the action of agglutinine and hæmolysine only takes place when a considerable quantity of well preserved red corpuscles are present. It was therefore determined to employ for injection human blood serum free from corpuscles, which causes the formation of *precipitine* in the serum of the animal injected.

Precipitine acts upon the dissolved albumins in the blood (globulins), and not like agglutinine and hæmolysine, upon the corpuscular elements, and hence the reaction is capable of being used for diagnostic purposes in the examination of blood from which, owing either to age or other causes, the corpuscles have disappeared. The method of procedure adopted was as follows:—10 c.c. of human blood serum, free from corpuscles, was injected into a rabbit five or six times, at intervals of two days. About six days after the last injection the animal was bled, and the blood allowed to stand in ice, for separation of the serum to take place. If $\frac{1}{2}$ c.c. of this serum was added to human blood serum diluted with physiological salt solution, or to human blood laked with distilled water, then a distinct cloudy precipitate at once occurred, either at the ordinary room temperature, or better, in an incubator at a temperature of 37° C.

The question had then to determine whether this precipitation was a specific reaction, *i.e.* whether it occurred only with human blood. The authors therefore tested the blood of twenty-three different animals, with the serum obtained from an animal into which human blood serum had been injected, and they found that with the single exception of the blood of a monkey, no precipitation occurred. In the blood of the monkey a slight precipitate formed after a considerable lapse of time.

In order to strengthen the diagnostic value of the test, it was necessary to determine whether the specific reaction took place under all conditions, more especially in the case of blood stains which had

been altered by time and exposure. Accordingly various articles—linen, knives, etc., were stained with human blood, and that of different animals, twenty-four in number, and the articles were allowed to lie about exposed for three months.

A portion of each stain was then dissolved in salt solution, the resulting solutions being filtered in order to render them clear, and 4 or 5 c.c. of each placed in test tubes. To each tube $\frac{1}{2}$ c.c. of serum taken from a rabbit previously injected with human blood-serum was added, and the tubes were then placed in an incubator at a temperature of 37° C. In the course of about twenty minutes the solution obtained from a human blood stain became distinctly cloudy, and a flocculent precipitate sank to the bottom. All the other solutions remained perfectly clear, except that containing the blood of the monkey, which showed a slight cloudiness.

As a result of their investigations, the authors are of opinion that by means of the above method the differentiation of human from animal blood can be made with certainty. The only possible source of error is that caused by the blood of the monkey, but this can scarcely be deemed an objection of importance under ordinary circumstances.

THE QUANTITATIVE EXAMINATION OF BLOOD.

IN the *Vrtljsch. f. gerichtl. Med.*, Berlin, Bd. xxi. S. 2, Strassmann and Ziemke give the results of an investigation they have carried out, in order to try and determine the quantity of blood lost from a body, by means of an examination of the earth, fabric, wood, etc., upon which it has fallen. They were incited to make the investigation through a well-known murder trial, in which the medical men who made the post-mortem examination stated that the amount of blood found effused around the body was much less in quantity than that which must have escaped. This conclusion gave rise to the belief that the murderer had been actuated by a desire to obtain the blood of his victim, and that the case was, in fact, one of murder for ritualistic motives.

Strassmann, whose expert opinion was asked on behalf of the defence, found nothing in the medical report to justify the conclusion of the doctors in regard to the quantity of blood lost. But the case suggested to him and Ziemke, the importance of attempting to discover a method by which a determination of the amount of blood effused might be scientifically arrived at from an examination of the articles upon which it had fallen.

There are many circumstances in criminal cases in which this question is of importance, as for example when a body is found with wounds upon it, and the small amount of effused blood suggests the possibility of the crime having been committed in another place, and the body afterwards removed to the spot where it was found; or again, when a question arises as to whether certain blood stains upon a bed are consistent with delivery having taken place upon it, etc.

An attempt to estimate the quantity of blood which has produced certain stains has not, so far as the authors are aware, been

previously made, and in the present investigation they have confined themselves to the question of stains upon textile materials, the estimation as regards earth and other substances being left for subsequent inquiry.

In the first instance the method adopted was to extract the blood with distilled water from the stain, and then determine the amount of hæmoglobin by means of Gower's hæmoglobinometer. The hæmoglobin having been determined in a measured portion of the stain, the quantity of blood it represents is estimated, and by a proportion sum the quantity represented by the total area of the stain.

In the case of recent stains, this method was found to give satisfactory results, the amount of error in the experiments carried out not exceeding 15 per cent.

In older stains, in which the oxyhæmoglobin has become transformed into methæmoglobin, the method of extraction with water is not applicable, and it is therefore recommended that a cold, saturated solution of borax, as recommended by Dragendorff, be used. In the solutions of blood stains thus obtained, estimations of the hæmoglobin gave good results, even with stains which were several months old.

The authors tried a second method of calculation, namely, by determining the dried solids in stains, and estimating the total quantity of blood which the weight of these solids would represent. They found experimentally that, even in stains many months old, an approximately accurate estimate could be made.

The conclusion come to is, that for recent stains the method of extraction by means of distilled water and estimation of the hæmoglobin, while for older stains the method of determination of the dried solids, afford the most satisfactory and reliable results, and enable a definite answer, under certain circumstances, to be given to the question as to the quantity of blood which certain stains represent.

The authors look forward to a more general importance resulting from their investigation should the methods they have devised afford equally favourable results in the examination of blood which has been effused on to earth and other substances.

A CASE OF VAGITUS UTERINUS.

In the *München. med. Wehnschr.*, 1901, No. 9, Frankenstein records a case where he was called in to attend a woman in her confinement. The patient, æt. 35, had a flat pelvis, and in her seven previous pregnancies the deliveries were accomplished with artificial aid. In the eighth labour, immediately after the rupture of the membranes, Frankenstein proceeded to turn the child, whose head was presenting. Immediately on seizing the foot the child gave out two cries, which were distinctly heard by the doctor, midwife, the mother, and also her husband, who was present. The birth was rapidly effected, and the child, which weighed seven pounds, immediately afterwards cried lustily. Both mother and child did well.

As in other recorded cases of a similar nature, the operative interference must have permitted access of air to the child, but Frankenstein is

positive that the respiratory movements could not have been set up by intra-uterine asphyxia, since the umbilical cord was not in any way compressed, and the child itself, after rupture of the membranes, was not subjected to any pressure sufficient to produce symptoms of asphyxia. He suggests that the seizure of the foot, in the first instance, set up a reflex inspiratory action, and that the subsequent operation of turning caused compression of the abdomen and a raising of the diaphragm, thus forcing the air out of the lungs again.

PERFORATION OF THE STOMACH AS A RESULT OF DRINKING A SOLUTION OF SODA.

A CHILD, æt. $3\frac{1}{2}$, drank some soda solution—of what strength is not mentioned—but quickly recovered from the effects after the stomach had been washed out. It appeared to be perfectly healthy and able to eat everything that was given to it, until one night about six weeks after the accident, when there occurred intense pain in the abdomen and violent vomiting. Laparotomy was recommended, but the parents refused permission for the operation, and the child died in two days. At the post-mortem examination there was found purulent peritonitis, and on the posterior wall of the stomach, near the pylorus, two small perforated ulcers.—*München. med. Wchnschr.*, 1901, No. 2, p. 82.

POISONING BY THE FUNGUS AGARICUS TORMINOSUS.

DR. HUGO GOLDMANN (*Wien. klin. Wchnschr.*, 1901, No. 12) had the opportunity of recently observing eleven cases of poisoning by this fungus, which had been eaten in mistake for edible mushroom, to which it bears considerable resemblance. Of the eleven cases, three were children, whose ages ranged from 2 to 14 years, and the rest were adults. Three deaths occurred—one child, after twenty-four hours' illness, and two adults, one after five days' and the other after six days' illness.

The symptoms produced consisted of gastro-intestinal irritation, and of others due to an effect upon the central nervous system. The former appeared first, usually in the course of four or five hours, and in some cases simulated closely an attack of cholera nostras, for which the condition might easily have been mistaken, more especially as cases of poisoning with the fungus occur most frequently during the summer time.

The patients first complain of nausea, headache, a feeling of anxiety, pain in the abdomen, followed by vomiting and profuse diarrhœa. The stools become watery and may contain blood, while there is also great tenesmus, and the patients soon become collapsed.

The secretion of urine is at first diminished, and finally anuria may exist. The urine is alkaline, and contains albumin and a large quantity of indican.

The skin is dry, and after a day or two becomes icteric. The pupils are dilated, but react to light and accommodation. The nervous symptoms observed consisted in a quickening but gradual weakening of the

respiration, diminution of the blood pressure, delirium, contracture of the extremities, trismus, convulsions, and finally the patient lapses into a state of coma.

The effects observed by Goldmann in his cases correspond very closely with those obtained experimentally by Hofmeister on animals after administration of agaricin, a substance extracted from a fungus *agaricus albus*, which is closely allied to the *agaricus torminosus*.

It is very probable, therefore, that the poisonous effects of *agaricus torminosus* are produced by agaricin, or a substance very similar to it, and that the action, after absorption, is chiefly upon the medulla oblongata. The post-mortem appearances when death occurs rapidly consist merely in signs of gastro-intestinal irritation. In one of the patients who survived for some days there was marked icterus, enlargement and fatty degeneration of the liver, cortex of the kidneys and of the heart muscle. The stomach was in a state of acute catarrh, the mucosa presenting a mammillated appearance. Capillary hæmorrhages were seen on the pleuræ, and also in the mucous membrane of the stomach and small intestine.

DISEASES OF THE EYE.

UNDER THE CHARGE OF

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CONGENITAL WORD-BLINDNESS.

It appears to be quite certain that there exists a condition of congenital word-blindness, and that this is the explanation of some of those cases which from time to time one sees,—in which a young patient, otherwise quite intelligent, fails to “take up” education in the ordinary way. The following is a brief note regarding one of Nettleship’s patients, which will explain the kind of case better than any other description:—“Mr. G., æt. 23, has always been a slow reader, a bad speller, and unable to do paper work, according to his tutor. For many years he had been taught orally, though he was able to read very slowly if he took pains; if he tried to read quickly he put the syllables of the longer words in the wrong order. He was unable to take in the name of a street, painted at the corner, as he passed. He remembered words by sound, but could not reproduce them by spelling. Yet his vision, when wearing the spectacles he had carried for many years, was quite up to normal standard.” Of course there are varying degrees of this condition, of which the patient referred to above may be said to have been a fairly well-marked example, and one must be awake to their existence. It was

curious and perhaps important to note that in a series of nine cases, eight occurred in boys or young men. A much larger number of cases would need to be observed before one could come to any conclusion as to the relative frequency in the two sexes. "The tendency to condone difficulty in reading in a girl," says Nettleship (but does any such tendency exist?), "may have led to cases being overlooked in females."—*Ophth. Rev.*, London, March 1901.

VISUAL ACUITY FROM A MEDICO-LEGAL AND INSURANCE POINT OF VIEW.

BOTH in France and America this question of the value of sight in law is exciting some attention at present. M. Dehenne, at a recent meeting of the French Society of Ophthalmology, advocated the appointment of a committee of the society instructed to draw up tables showing the minimum amount of sight required for a large series of occupations, on the lines recognised by the army, by the railway service, etc. It is obvious that if two men, who have both full sight, receive, each of them, an injury which reduces his vision in one eye to $\frac{6}{24}$, one of these men, who is, let us say, a watchmaker or a proof-reader, has in reality received a far more serious damage than the other, who is a ploughman or a day labourer. An equal degree of loss may entail an enormously different degree of injury to earning power. Dehenne's idea then is, that if once the minimum vision were thus fixed, we should have got a long way towards fixing the amount of compensation due for loss by injury or otherwise. Supposing that for a certain occupation the "professional minimum" is fixed at $\frac{6}{24}$, an injury which reduces the vision from normal to a point *above* this limit will require no compensation. There must also be fixed what he calls the "inferior limit of professional vision," the lowest amount of sight, namely, with which a patient can work at that particular trade. Calling the superior and inferior limits of professional vision for any occupation s and i respectively, one can find the professional acuity (Vp) of an individual very simply by means of the formula

$$Vp = \frac{v - i}{s - i}.$$

It is certain that in a great number of occupations a reduction of vision by even one half would not prevent the patient from working practically as well as before. Dehenne, who is surgeon to the police force of Paris, fixes the limit for the force, for example, at $\frac{1}{6}$ for each eye separately, and $\frac{1}{4}$ for the two combined. He finds that if a man's vision is not below this minimum he is as good as if he had full sight. Obviously, too, in many occupations glasses are not permissible, no matter how sharp the sight might be when they were worn,—in the police, for example. Several of the speakers at the meeting referred with approval to the German tariff-table, which showed the amount of loss of efficiency caused by each degree of loss of sight in one eye along with any degree in the other, as well as the proportion of wage-rate which would be the appropriate compensation. One peculiar point about this table was that in the case of complete or almost complete loss of both eyes, the appropriate compensation is shown as more than 100 per cent. of the former wage-rate, reaching in the extreme case a maximum of 125 per cent. At first sight this appears strange, but the indication is that

a man who has completely lost his sight is not merely unable to work, but unable, without assistance, to take care of himself. According to German law, additional compensation may be exacted for disfiguration ; but this is not so in France.

At a meeting of the American Medical Association, Hansel read a paper on this subject also ; he mentioned that the U.S. Pension Bureau paid as compensation for disability arising from loss of sight at the rate of 72 dollars per month for blindness of both eyes, 17 for the loss of one eye, and 12 for the loss of the sight of one eye. The degree of loss to the earning power in complete monocular blindness has been, he thinks, greatly exaggerated, for at least the majority of occupations can be quite well followed by a man with only one eye.

There is, however, a view of the matter which does not appear to have presented itself either at the French or the American Society meetings, namely, that while a man may be perfectly well *able* to work with one eye only, he may find it an extremely difficult thing to *obtain* work ; employers of labour have a strong prejudice in favour of a man possessed of all his members, especially in these days of Workmen's Compensation Acts, when an employer can hardly be expected to engage a man who has any defect at all, since he may have so large a bill to pay for compensation.—Reports of the Meetings of the above Societies.

ADENOIDS AND NEURITIS.

To judge from a case recorded by Königshöfer of Stuttgart, adenoids are capable of setting up optic neuritis, at all events in a person who has a constitutional liability to inflammatory affections of nerves. The author's patient was a girl of 21, who came to consult him on account of symptoms which turned out to be due to a neuritis of the retrobulbar type, but with distinct ophthalmoscopic changes ; this condition resisted all treatment until the swollen tonsils and naso-pharyngeal adenoids were cleared out, when immediate and great improvement in the vision and appearance of the nerve took place. The patient showed her liability to nerve affections by suffering from neuritis of the sciatic and other nerves of the legs after influenza.—*Clin. Opht.*, Paris, Feb. 10, 1901.

IMPROVEMENTS UPON ENUCLEATION.

From time to time new suggestions are being constantly made, whereby the simple operation of enucleation of the globe may be improved upon in such a way as to provide a better stump for the adaptation of the artificial eye, which thus may not appear so sunk in as it is apt to do. The methods thus employed are numerous,—evisceration, the whole of the muscles and the sclerotic being left behind, implantation into the scleral cavity or into Tenon's capsule of globes of glass, celluloid, or silver, masses of sponge, balls of catgut, head of rabbit's femur, natural or decalcified, and what not. All these things, however, are very apt either to cause violent reaction, to be extruded, or to be completely

absorbed, and so the object aimed at defeated. The latest suggestion comes from Lagrange (Bordeaux), who has transplanted into Tenon's capsule the entire eye of a rabbit. Immediately the enucleation is performed the eye of a young rabbit is removed and introduced into Tenon's capsule, and the muscles sewn over it in pairs. He has only done this singular operation four times, and the results do not strike the reader as being very much superior to more simple and less objectionable methods, but Lagrange seems pleased so far. Rohmer (Nancy) recommends the injection into the subconjunctival cellular tissue of 1 c.c. of liquid vaseline; this he does some two to three weeks after enucleation. The oil seems to take a long time to absorb, if it does not permanently remain, and the improvement in appearance by the lifting up of the artificial eye is, he says, very great.—Lagrange, *Ann. d'Ocul.*, Paris, March 1901; Rohmer, *Clin. Opht.*, Paris, Feb. 25, 1901.

IRITIS AND GLAUCOMA IN DIABETES.

AMONG the rarer, and indeed but comparatively recently recognised, manifestations of diabetes is iritis; Goldzieher of Budapesth relates a case presenting certain points of unusual interest. A man of 51, whose organs were apparently sound, but whose urine contained 4 per cent. of sugar, was attacked by violent iritis. The tension was not increased, but the cornea was dull and steamy, and besides the ordinary symptoms of a very acute iritis, his anterior chamber was found to contain a quantity of pus. In spite of the customary treatment, and generous but strictly correct diet, things became much worse, the pus increased in amount, and the cornea became nearly opaque. The anterior chamber was therefore tapped, the pus coagulum cleared out, and iodoform introduced. Immediate improvement resulted, the pupil dilated, no more pus collected, and vision improved considerably. About six months later, however, the eye was attacked by glaucoma, the tension becoming extremely hard; prompt iridectomy gave great relief, and he recovered some useful sight. In this case, in which the total absence of any tendency to hæmorrhage is very noteworthy (for this is so frequent a form for diabetic lesions of the eye to take), Goldzieher attributes the glaucoma to the changed condition of the aqueous humour, whereby it had become more albuminous, and therefore, as is well known, more difficult of removal by osmosis at the angle of the anterior chamber. It may, however, have been caused by inflammatory alteration of the vessels and tissues about Schlemm's canal.—*Centralbl. f. prakt. Augenh.*, Leipzig, March 1901.

REPORTS OF THE MEDICAL SOCIETIES.

EDINBURGH OBSTETRICAL SOCIETY.—*May 8, 1901.*—Dr. HAULTAIN, Vice-President, in the chair. SPECIMENS.—Dr. J. W. BALLANTYNE showed two deformed pessaries.—Dr. HAIG FERGUSON showed two cystic papillomata of the ovary.—Dr. HAULTAIN showed—(a) Gravid uterus, with fibromyoma, removed by abdominal hysterectomy; (b) thin-walled dermoid ovarian tumour, which had ruptured on three occasions previous to removal. COMMUNICATIONS.—Professor CAMPBELL KYNOCH read a note on “Primary Carcinoma of the Female Urethra.” He first of all classified the various forms of urethral tumours, and specified the varieties of malignant growths which are found. He referred to the literature of the subject, and pointed out that carcinoma of the urethra as a primary condition was extremely rare. The treatment was not satisfactory, as recurrence was very frequent. He then narrated a case which had recently come under his observation and management.—Dr. J. B. BUIST read a paper on “The Art of Vaccination.” He first of all discussed the best methods of operating, and condemned punctures, lacerations, and abrasions. He preferred a series of small incisions, and advocated the production of *four* marks of definite area—each two lines square. He strongly disapproved of what he called the “usual Edinburgh method”—the production of one or two marks. Dr. Buist showed various instruments which had been devised for vaccination. The majority of these he condemned as barbarous or as unsatisfactory. He then discussed the composition and action of vaccine materials, and pointed out that the admixture of glycerin attenuates the protective power of vaccine, and that it is only temporarily protective. Hence, periodic general revaccination had become necessary.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.—*May 1, 1901.*—Mr. A. G. MILLER, President, in the chair.—Dr. NORMAN WALKER showed—(1) A case of lupus; (2) a case of rodent ulcer, both of which had been much improved by X-ray treatment; (3) a case of Bazin's disease.—Mr. SHAW M'LAREN showed Schlagintweit's cystoscope.—Dr. J. V. PATERSON gave a lantern and microscopic demonstration of slides, illustrating eye diseases.—Dr. W. RUSSELL read a paper on “Arterial Hypertonus and Arterio-sclerosis: their Relations and Significance.” The term arterio-sclerosis is somewhat loosely applied by various writers, and under it we find included such conditions as atheroma, generalised arteritis, and compensatory hypertrophy of the tunica intima after dilatation. This latter condition is probably brought about by the elasticity of the vessel wall being reduced by various causes; as a consequence the vessel dilates, and the stream is retarded; the intima then thickens to restore the lumen to the normal, and so the rapidity of the flow is restored. Atheroma is a primary disease of the tunica intima. Dr. Russell is of opinion that arterio-sclerosis is a generalised affection of arteries, consisting in—(1) thickening of the tunica media, (2) thickening of the tunica intima without atheromatous degeneration, and (3) occasional thickening of the tunica adventitia. The thickening of the intima is not, according to Dr. Russell, compensatory to dilatation of the vessel. It frequently goes on to complete occlusion of the lumen, and does not stop short of compensation. Arterio-sclerosis is recognised clinically by examining the radial artery. The thickening is uniform, unlike atheroma, which

is patchy. The pulse may be of high tension, but it may be of low tension, and this should be carefully noted. The artery may be relaxed or in a state of spasm. Hypertonus is a prolonged increased contraction of the vessel wall. It usually causes increase of tension, if the ventricle be healthy. It occurs in both normal and sclerosed arteries, and at all ages. In the healthy it raises the blood pressure, but in old persons it does not, and often precedes heart failure. It is due to auto-intoxication, from errors in diet, and in all diseases where there is absorption of deleterious substances. It leads to hypertrophy of the muscle in the tunica media, sclerosis following later. Hypertonus is got rid of by the administration of nitrites. The changes in the calibre of the vessel before and after the administration were measured, and in several cases of arterio-sclerosis a marked difference was observed. Arterio-sclerosis may affect the arteries outside the kidney, without there being corresponding changes in the kidney vessels.

Clinical Meeting, May 15, 1901.—Mr. A. G. MILLER, President, in the chair.—Dr. BRUCE showed—(1) A case of paralysis of the brachial plexus; (2) a case of disseminated sclerosis.—Dr. BYROM BRAMWELL showed—(1) A case of a peculiar form of muscular atrophy; (2) a case of syringomyelia.—Dr. E. CARMICHAEL showed a patient with a hypertrophic condition of the integument, probably due to distended lymphatics.—Mr. CAIRD showed—(1) A patient from whom he had removed the pylorus twenty-one days before; (2) a patient after jejunosotomy.—Mr. ALEXIS THOMSON showed a patient after enterectomy, for multiple tuberculous stricture of the small intestine.—Dr. FRANCIS BOYD showed a patient with stenosis of the pulmonary valve.—Mr. STILES showed a boy, after operation for idiopathic cerebral hæmorrhage.—Mr. COTTERILL showed—(1) A patient with a rodent ulcer of the face, under treatment by the X-rays; (2) a case of joint affection in a hæmophilic patient.—Dr. SCOT SKIRVING showed—(1) A brain, showing track of a Mauser bullet; (2) brain from a case simulating rupture of the middle meningeal artery; (3) specimens illustrating the effect of bullet impact; (4) stomach eight days after operation for perforation; (5) large perineal tumour (5 lb.), with photographs.—Dr. BRUCE showed microscopic specimens and photographs of—(1) Progressive muscular atrophy; (2) amyotrophic lateral sclerosis; (3) glioma of pons.—Mr. CAIRD showed—(1) Tumour of pylorus; (2) vesical calculi; (3) vesical papillomata.—Mr. ALEXIS THOMSON showed—(1) Two feet of small intestine, showing four tuberculous strictures; (2) form of syringe for iodoform injections, etc.—Dr. LOGAN TURNER showed—(1) Two casts showing congenital malformation of the auricle; (2) larynx from a case of primary laryngeal diphtheria.—Mr. STILES showed—(1) Intestines from a case of so-called idiopathic distension of the colon; (2) sarcoma of the testicle from a child æt. 8 months.

GLASGOW PATHOLOGICAL AND CLINICAL SOCIETY.—*May 13, 1901.*—Mr. HENRY E. CLARK, President, in the chair.—Mr. A. E. MAYLARD showed a man, æt. 22, on whom he had performed colo-colostomy, for a stricture near the sigmoid flexure. He considered the stricture as resulting from a tuberculous ulceration, followed by cicatrisation. The anastomosis was made by attaching the sigmoid below the stricture to the dilated descending colon. No mechanical aids were employed. Mr.

Maylard read notes of a case of multiple tuberculous stricture of small intestine, for which he had done a jejuno-colostomy. The patient was a girl, *æt.* 18, and although much relieved by the operation, she was going downhill from starvation.—Dr. JAMES LAWRIE (Greenock) showed a man on whom he had operated for ruptured traumatic aneurysm of the femoral artery, at the apex of Scarpa's triangle. He had excised the aneurysm, after temporary ligatures had been applied to the artery above and below the lesion. The patient, a man, *æt.* 44, had a history of rheumatic fever and syphilis.—Dr. HENRY RUTHERFORD showed, for Dr. NEWMAN—(1) Resonator for detecting calculi in the lower end of the ureter; (2) Harris's urine segregator; and (3) Schlagintweit's cystoscope.—Prof. MUIR, Drs. E. J. PRIMROSE and LAWRIE, showed specimens.

GLASGOW MEDICO-CHIRURGICAL SOCIETY.—*May* 3, 1901.—Dr. MIDDLETON showed a typical case of gout in a man, *æt.* 65. The first attack occurred twenty-five years ago. There was an interval of five years between that and the next one. The intervals have gradually become shorter, and now the attacks occur once a year or oftener. Up till the first attack the patient had taken no alcohol except beer, and that in moderation.—Dr. LESLIE BUCHANAN read "Notes on Iridiræmia, with Remarks on Histological Examination of Cases." Iridiræmia (absence of iris) was either (1) congenital, (2) the result of injury, or (3) the result of prolonged pressure. Congenital iridiræmia was usually bilateral and moderately hereditary. The traumatic form was, as a rule, the result of severe injury. The origin of iridiræmia from pressure was difficult of discovery. The iris was rarely completely absent. Instances of the various kinds of iridiræmia were then given.—Dr. MIDDLETON and Dr. NEWMAN gave an account of some cases of ruptured gastric ulcer.—Dr. ERNEST THOMSON read notes of a case of unilateral acute retrobulbar optic neuritis, probably due to chill, and followed by recovery. The patient, a young lady, *æt.* 21, complained of having become almost blind in the left eye, in the course of three or four days. The fundus changes were not marked. The veins were over-full, but there were no hæmorrhages. The treatment was by mercury and potassium chloride and blisters to the temple.

May 10, 1901.—Dr. NEWMAN showed, along with Dr. FULLARTON—(1) A case in which a large epithelioma of the larynx was removed by thyrotomy. The epithelioma grew from the right vocal cord, and there was a suspicion of disease in the left vocal cord. All the soft parts down to the cartilages were removed. (2) A case of cystic disease of the thyroid, where spontaneous cure followed the formation of an abscess. The tumour was tapped, and this was followed by increase of swelling and pain, probably due to hæmorrhage. About six months later the swelling increased enormously. An incision was made, and pus evacuated, after which recovery followed.—Dr. J. G. CONNAL showed—(a) A man with multiple exostoses of both external auditory canals. Complaint was made of loss of hearing. Cerumen was found in both ears. After removal of the cerumen the patient heard much better. Nothing was done to the exostoses. (b) Two cases of extensive cicatrisation of the pharynx, one from sloughing of the tonsils after scarlet fever; the other from secondary syphilis.—Dr. EDINGTON showed microscopic sections of a tumour mass in a cat. The tumour was found to be an alveolar carcinoma.

ANALYTICAL REPORTS.

SAVON DU TRANSVAAL.

(Blanche Leigh Soap, Paris and London.)

MADAME BLANCHE LEIGH carries on a crusade against manufacturers of special soaps, who, according to her statement, are but too wont to procure common "bar soap, perfume it, . . . and give it forth to the world as their special product." It is not quite clear from this, how some of the said peccant manufacturers err in transforming "bar soap" into superfatted soaps merely by adding perfume, although they "generally manipulate" it in addition. Indeed, if the common bar soap be employed as a basis, and be superfatted and "generally manipulated," surely the worth of the product is valuable in direct relationship to the skill employed in the treatment of the crude article. Should this be merely perfumed, and the product sold as superfatted soap or the like, detection would be sure to follow. Madame Leigh claims credit for manufacturing the basis of each cake of soap sold by her herself; that is so much the more to her credit, but does not imply that she alone can manufacture *sans peur et sans reproche* the soapy basis which needs must serve to breed all other soaps from.

So much for her contention as to the benefits of personal soap boiling. A more important fact is, that by some method or other she, or her chemists, have been able to compound an ichthyol soap free from the usually disagreeable smell of that substance, and in truth delicately perfumed. The percentage of deodorised ichthyol present in the soap, termed "Transvaal Soap" because it was largely used on the Hospital SS. "Maine," is 2.5; for special purposes, when a more powerful action is required, a similar soap containing 12 to 15 per cent. of ichthyol may be procured. *Le Savon du Transvaal* is certainly an agreeable soap to use, is free from crude alkali, and has a faint but pleasant perfume. Its reputed antiseptic power must be looked upon with caution; soothing to the epidermis, no doubt, above most other soaps, and specifically sedative in many of the nervous and autotoxæmic conditions of the skin, it can hardly be classed under antiseptic remedies. Carbolic acid, pure or in watery solution, is a fairly energetic anti-bacterial agent; in oil or vaseline, but a poor one; in soap, inert. Iodoform is of great service in modifying chronic inflammatory processes, but in itself has no antiseptic properties until decomposed, and then these are but slight. Iodoform ointments and soaps are still less efficacious antiseptically. Ichthyol is chiefly an epidermal sedative; it acts probably rather on the peripheral nerve fibrils than antiseptically upon organisms which have invaded

the epidermal layers; given internally, it often is as quickly efficacious, in cases of obstinate nettlerash and the like, as when applied externally.

These remarks by no means detract from the value presented by an ichthyol soap, whether containing 2·5 or 15 per cent. of the active substance, and which is free from the odour of ichthyol so peculiarly obnoxious to many people. Personal experience of the Transvaal soap confirms the statements made by its maker, that it renders the skin soft and comfortable. Its employment in a case of urticaria was followed with happy results. One of the objections which might be put forward against the name of the soap, not the soap itself, is the well-known disinclination of the Boers of the Transvaal towards the use of soap in any form, perfumed or otherwise; but in truth, although of French origin, the name adopted perhaps points to the presence now of members of a cleaner race in the land, and the superiority of soap users over disdainers of those effeminate enough to wash off Nature's gown.

MEDICAL NEWS.

AFRICAN CIVIL SURGEONS' DINNER.

A DESIRE has been generally expressed by men recently serving as civil surgeons in South Africa, to hold a dinner. Derby day, Wednesday, June 5, the anniversary of the occupation of Pretoria, is suggested for the purpose. It is proposed to include all civilian medical men, whether attached to the R.A.M.C. or to private hospitals. Sir W. MacCormac has consented to preside, and the following have already expressed their intention of being present:—Mr. Makins, Professor Chiene, Mr. Watson Cheyne, Mr. Cheatle, Sir Wm. Thomson, Mr. Bowlby, Mr. Fripp, and Dr. Tooth.

The following provisional committee has been formed:—Mr. Anthony Bowlby, Chairman of Committee; Messrs. C. S. Wallace (St. Thomas's) and E. A. Houseman (St. George's); Dr. A. Conan Doyle (Edin.); and Messrs. J. F. R. Gairdner (Glasgow and Leeds), and E. L. Hunt, (Dublin).

We shall be glad to receive suggestions at the following address, and hope to publish details at a later date.

C. GORDON WATSON (Bart.'s),
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MONTHLY NOTES ON METEOROLOGY AND VITAL STATISTICS.

By A. LOCKHART GILLESPIE, M.D., F.R.S.E., F.R.C.P.Ed.,

MEMBER SCOTTISH METEOROLOGICAL SOCIETY.

METEOROLOGICAL MEANS FOR THE EAST OF SCOTLAND DISTRICT, FOR THE FOUR
WEEKS ENDING APRIL 27, 1901; AND FOR THE YEAR FROM JANUARY 1.

	TEMPERATURE.			RAINFALL IN INCHES.		SUNSHINE. HOURS.		Mean Daily Variability of Temperature.
	Mean.	Accumulated Day-Degrees.		Actual.	Accumulated from Jan. 1.	Actual.	Accumulated from Jan. 1.	
		Above 42°.	Below 42°.					
Mean . {	43°·5	1* 124°	76°	1·9	9·2	128	345	2°·8
Observed {	43°·3	2 267°	577°	1·9	8·4	163	338	3°·07
		1 137°	92°					
Difference {	- 0°·2	2 201°	627°	±0	- 0·8	+ 35	- 7	+ 0°·27
		1 + 13°	+ 16°					
		2 - 66°	+ 50°					

VITAL STATISTICS.

MORTALITY IN FOUR LARGE TOWNS IN THE EAST OF SCOTLAND (EDINBURGH, DUNDEE, ABERDEEN, AND LEITH), DURING APRIL, AND SINCE JANUARY 1, 1901. Actual Numbers and Rate per 10,000 per annum.

	TOTAL.		CONSTITUTIONAL DISEASES.		CIRCULATORY SYSTEM.		RESPIRATORY SYSTEM.		NERVOUS SYSTEM.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899 {	1 1165	198·2	230	39·2	121	20·6	239	40·7	131	22·3
	2 4973	211·3	924	39·3	471	20·0	1104	46·9	547	23·3
Actual Deaths and Rate per 10,000 {	1 1385	235·4	253	43·0	130	22·1	272	46·2	169	28·7
	2 5005	212·7	984	41·8	493	20·9	955	40·7	571	24·3
Difference from Mean {	1 +220	+37·4	+23	+3·8	+9	+1·5	+33	+5·5	+38	+6·4
	2 +32	+1·4	+60	+2·5	+22	+0·9	-149	-6·2	+24	+1·0
	DIGESTIVE SYSTEM.		URINARY SYSTEM.		PNEUMONIA.		PHTHISIS.		CANCER.	
	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.	No.	Rate.
Deaths expected and Mean Rate for 1891-1899 {	1 66	11·3	32	5·4	97	16·6	117	19·9	46	7·8
	2 285	12·1	122	5·2	409	17·4	476	20·2	199	8·45
Actual Deaths and Rate per 10,000 {	1 91	15·5	33	5·6	127	21·6	114	19·5	62	10·5
	2 319	13·6	139	5·9	402	17·1	443	18·8	243	10·32
Difference from Mean {	1 +25	+4·2	+1	+0·2	+30	+5·0	-3	-0·4	+16	+2·7
	2 +34	+1·5	+17	+0·7	-7	-0·3	-33	-1·4	+44	+1·87

* NOTE.—The figures¹ denotes the data for April, ² for year to date.

The weather of the four weeks ending April 27 may be separated into two distinct parts: the first fortnight was cold and wet, but with increase in hours of bright sunshine during its first week; the second half was warmer, dry, and sunny. In the last week of the period a mean of 61 hours of bright sunshine were registered in the east of Scotland, in place of the average 35 hours; an increase of almost 75 per cent. The mean daily variability of temperature was greater than usual. The rainfall for the four weeks equalled the average; the accumulated day-degrees above 42° were more than expected, while those below that point were even more so. The mean temperature was very slightly below the average.

The values accumulated for the first four months of 1901 show lack of warmth, and excess of cold, equal to nearly 25 per cent. and 9 per cent. respectively. The rainfall shows a deficit of almost 1 inch; sunshine has been practically normal, thanks to the excess during the last week of April.

Notwithstanding the comparatively favourable weather in April, the deaths in the four towns exceeded the calculated mean for the month by 220, or 18·8 per cent. of increase. Except phthisis, all the causes of death discussed yielded larger numbers of deaths; digestive diseases showing an increase equal to 38 per cent., cancer to 35 per cent., pneumonia to 31 per cent., of their average values. Influenza caused 17 deaths.

No deaths from smallpox occurred in these towns, but 26 were registered in Glasgow during the month.

The deaths for the year to date are a little above the average; those caused by respiratory diseases, pneumonia, and phthisis alone exhibiting decrease. The increase under cancer is even larger than at the end of March.

Adding the 26 deaths from smallpox to the 167 previously recorded for 1901, the total reaches 193; 143 vaccinated (doubtful in 10), 50 unvaccinated. Among the latter, 62 per cent. were less than 20 years old, 48 per cent. below 5; of the former, only 1·4 per cent. were under 20 years at the time of death.

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